23. Armco, 4/29/88, 11:35 a.m.

Close-up of soil pile partially covered with vegetation at Landfill. The soil, described as clay, will be used to close the facility.

24. Armco, 4/29/88, 11:37 a.m.

"No Dumping" sign on facility Entrance Gate.

RCRA RECORD CENTER
Infiling Cover Sheet

NAME B. Vadem

PHONE 8310

MAIL CODE 6H-PA

DATE 9/6/94

EPA I.D.#	FACILITY NAME	TYPE FILE
TXD000802942	Armco	Tech

RCRA Implementation Contract
Zone II
Regions VI-X

PRC

PRC Environmental Management, Inc.

In Association with:
NUS Corporation
ICF Technology, Inc.
Versar, Inc.
Ecology & Environment, Inc.
HydroGeoLogic, Inc.

RCRA FACILITY ASSESSMENT REPORT
ARMCO, INC. - HOUSTON WORKS/
GREENSPORT INDUSTRIAL PARK
HOUSTON, TEXAS

Prepared for

U.S. ENVIRONMENTAL PROTECTION AGENCY
Region 6
Allied Bank Tower, 12th Floor
1445 Ross Avenue
Dallas, Texas 75202

Prepared By:
PRC Environmental Management, Inc.
350 North St. Paul
Suite 2600
Dallas, Texas 75201

and

ICF Incorporated
9300 Lee Highway
Fairfax, VA 22031

EPA Contract No. 68-W9-0041

Work Assignment No. R2679
Project No. 02

October 1993

TABLE OF CONTENTS

FIGURES

TABLES

DISCLAIMER

This report was prepared for the U.S. Environmental Protection Agency (U.S. EPA), Region 6 by PRC Environmental Management, Inc. and ICF Incorporated in fulfillment of Contract No. 68-W9-0041, Work Assignment No. R2679, Project No. 02. The opinions, findings, and conclusions expressed herein are those of the contractor and not necessarily those of EPA or other cooperating agencies. Mention of company or product names is not to be considered as an endorsement by EPA.

This document is intended to assist EPA and state personnel in developing requirements for a Resource Conservation and Recovery Act (RCRA)-regulated facility owner or operator to conduct a RCRA Facility Investigation (RFI) pursuant to Title 40, Code of Federal Regulations (CFR), Part 264. EPA will not necessarily limit the RFI or other requirements to those that correspond with the recommendations set forth herein. EPA and state personnel must exercise their technical judgment in using the RCRA Facility Assessment report, as well as other relevant information, in determining what RFI or other requirements to include in a permit or order.

EXECUTIVE SUMMARY

ICF Incorporated (ICF) conducted a Resource Conservation and Recovery Act (RCRA) Facility Assessment (RFA) at Armco, Inc. Houston Works/Greensport Industrial Park in Harris County, Texas, EPA ID No. TXD000802942. The RFA included a preliminary document review (PR), followed by a visual site inspection (VSI). Files were inspected during the PR at the Texas Water Commission (TWC) and the U.S. Environmental Protection Agency (EPA) Region 6 offices. The PR was followed by a VSI to (1) determine the facility's current operating status, (2) identify solid waste management units (SWMUs) and areas of concern (AOCs), (3) assess the regulatory compliance of those units, and (4) assess actual and potential releases to the environment from those units.

The Armco facility is the site of a former steel plant and is currently the Greensport Industrial Park owned and managed by Armco Incorporated. Steel operations began in 1942 and ceased in 1984. The facility was an integrated steel mill that produced primary steel products (e.g., plates, rolls, billets). Armco operated a lime plant, coke plant, and a sinter plant, which produced material for the blast furnace. The blast furnace produced iron ingots from the lime, coke, and sinter. The iron ingots were processed into molten steel in the facility's open hearth and electric furnaces, which was poured into molds to form ingots. When the ingots solidified, they were taken to soaking pits where they were soaked in heat until they reached uniform temperature throughout. The reheated ingots were taken to finishing mills, where they were "hot formed" or rolled into slabs, blooms, or billets in various mills on site. Some steel was further processed into wire, which involved shaping and coating. Steel-making operations generated wastewaters, sludges, fines, and dust in various processes of heating and shaping steel.

Armco managed an ore bedding area which recycled waste from the lime and sinter plants, and fines from throughout the facility. The blast furnace generated dust and sludge, which was also recycled to the ore bedding area. The material from the ore bedding area was agglomerated in the sinter plant and used as a source material in the blast furnace.

Five surface impoundments at the facility managed much of the steel-making waste and all have been certified closed by TWC as filled and capped in place.

- Until the early 1970s, coke plant waste was disposed of in the East Acid Surface Impoundment. In 1973, the surface impoundment was closed and the coke plant incinerator was constructed and began accepting the waste.

- Most process wastewaters from throughout the plant were transferred to the West Surface Impoundment for cooling and settling, after initial settling in various clarifiers and basins. After cooling and settling, water in the West Surface Impoundment was pumped back to the scrubbers in Electric Furnace Shop No. 1 for reuse and excess water was discharged to the Houston Ship Channel.

- Wastewater from the Rod Mill went to the North and South Rod Mill Surface Impoundments for settling and cooling until 1970, when the Rod Mill shut down. After cooling and settling, water was recycled to the Rod Mill and excess wastewater was transferred to the West Surface Impoundment.

- Wastewater from the mold foundry went to the Mold Foundry Settling Chambers for cooling and settling. After cooling and settling, the wastewater was recycled to the Mold Foundry, excess wastewater was discharged to the channel, and the sludge was transported off site or transferred to the East End Surface Impoundment.

The electric furnaces generated filter cake media and later, when a baghouse was added to Electric Furnace Shop No. 2, baghouse dust. These wastes were taken off site daily and disposed of at Armco's Green Bayou landfill.

Wire cleaning processes generated spent pickle liquor containing sulfuric acid, chromium, and lead. Wire coating generated spent copper and permanganate solutions. These wastes were stored in tanks and disposed of off site. Two container storage areas were also managed by Armco. One area stored drums of PCB waste, and the other stored used oil and spent solvents for less than 90 days. All stored waste was disposed of off site.

Upon ceasing steel-making operations in 1984, Armco dismantled and removed or closed its 32 SWMUs and began to sell off portions of the site and lease other areas to tenants. Most current tenants are stevedores or landlords who lease space for equipment storage and do not generate any waste. Several tenants conduct welding, painting, and cleaning operations and routinely generate and store waste. Since 1984, Armco and its tenants have built and managed 14 additional SWMUs. Thirteen are still being used.

The Armco facility submitted a Notification of Hazardous Waste Activity on August 15, 1980, and a Part A Permit Application on November 18, 1980, to EPA Region 6 for handling of ignitable and corrosive wastes (Armco, Inc., 1980). Armco was granted interim status on July 17, 1981 (U.S. EPA, 1981). On July 11, 1983, Armco submitted another revised application to their Part A application to reflect the current operations and to conform to the most recent regulations (Armco, Inc., 1983). When the plant ceased operations in 1984, Armco submitted documentation to withdraw from the hazardous waste management facility permitting process. On August 15, 1985, the Texas Department of Water Resources (TDWR) issued a letter stating that the Armco site qualilified for the claimed exclusion from the permitting process; however, the facility had not operated so as to qualify for exemption from permitting requirements at all times since November 19, 1980. Because of the hazardous waste management operations at the open hearth drum storage area, TDWR stated that Armco was required to comply with closure procedures for that unit (TDWR, 1985).

The Armco facility is permitted by EPA and the state for its surface water discharges. Under the Clean Water Act, Armco operates under NPDES Permit Nos. TX0008524 and TX0088404, and TWC Permit Nos. 00509 and 02579 for controlled discharges to the Houston Ship Channel Segment No. 1007 via approved outfalls. Armco operated under these permits when in full steel-making operation, and the permits have been amended over the years to reflect the changes in operations from steelmaking to an industrial park. (Engineering-Science, Inc., 1984)

In the early 1970s, Armco applied for and received Underground Injection Control Permit No. WDW90. The underground injection well was never used and has been sealed. (U.S. EPA, 1972)

When steel-making operations were underway, the Armco facility operated under Texas Air Control Board Permit Nos. R-15, R-1373, R-3742, R-5042, R-5072, C-6145, C-6570, C-9056 and under the PSD program Permit No. CAA TX-27. Various production units at the facility were covered under these permits. (TACB, 1982)

ICF identified 26 potential SWMUs during the PR. Based on the VSI, 46 SWMUs and no AOCs were identified. Of the 46 SWMUs, 13 are active and 30 require further investigation.

1.0 INTRODUCTION

ICF Incorporated (ICF), a subcontractor to PRC Environmental Management, Inc. (PRC), received Work Assignment No. R2679, Project No. 02 from the U.S. Environmental Protection Agency (EPA) under Contract No. 68-W9-0041. Under this work assignment, ICF is contracted to provide technical support on a Resource Conservation and Recovery Act (RCRA) Facility Assessment (RFA) for the Armco, Inc.-Houston Works/Greensport Industrial Park (Armco).

This report describes the findings of a preliminary review (PR) and a visual site inspection (VSI). It includes (1) a description of the facility and its solid waste management units, (2) an identification of waste potentially released by migration pathways, and (3) a summary of conclusions and recommendations regarding further activity.

1.1 PURPOSE OF THE RCRA FACILITY ASSESSMENT

The purpose of the RFA is to identify environmental releases or potential releases from solid waste management units (SWMUs) that may require corrective action. The RFA is the first step in implementing the corrective action provisions of the 1984 Hazardous and Solid Waste Amendments to RCRA. Specifically, Sections 3004(u), 3004(v), and 3008(h) grant EPA the authority to initiate corrective action for releases of hazardous wastes and constituents from SWMUs at RCRA-regulated facilities. An RFA generally consists of (1) a PR, (2) a VSI, and, if necessary, (3) a sampling visit (SV). A sampling visit is conducted only when available information is insufficient to support a recommendation for a RCRA Facility Investigation (RFI). The RFA at Armco did not include sampling.

According to EPA's RFA Guidance Document (U.S. EPA, 1986), the four purposes of an RFA are as follows:

1) Identify and gather information on releases at RCRA-regulated facilities.

2) Evaluate SWMUs and other areas of concern (AOCs) for releases to all media, and regulated units for releases to media other than ground water.

3) Make preliminary determinations regarding releases of concern and the need for further actions and interim measures at the facility.

4) Screen from further investigation those SWMUs and AOCs that do not pose a threat to human health and the environment.

An RFA is performed when RCRA permits are requested or modified, or when the facility ceases its management of RCRA-regulated solid wastes. An RFA was performed because the facility submitted a Part A Application in November 1980.

1.2 PROCEDURES

The RFA was conducted in accordance with procedures outlined in the EPA's RFA Guidance document (U.S. EPA, 1986). PRC conducted the PR at TWC in Austin, Texas and at EPA Region 6 in Dallas, Texas, in June 1993.

ICF reviewed documents relevant to the RCRA program. The main sources of information were (1) the RCRA Part A Permit Application, (2) correspondence with state and federal agencies concerning the facility, and (3) previous inspection reports. ICF used the information collected during the PR to prepare a list of potential SWMUs. ICF then submitted this potential list of SWMUs, along with a request for general facility information, through the EPA to Armco's representative for review and input. Armco's response was received via a telephone conversation with Jim Berryman, of Armco, Inc. in July 1993.

ICF conducted the VSI between August 30 and September 1, 1993. Upon arrival at the site, representatives from the facility, the Texas Water Commission, EPA Region 6, and ICF held a preliminary meeting to discuss the site's history, organization, and operations, to request documents, to cover Armco's health and safety plan, and to answer questions concerning Armco's hazardous waste management practices. ICF explained the purpose of the visit and discussed the RFA and process. Meeting attendants included the following:

- James Berryman - Armco, Inc.
- Harold McCune - Armco, Inc.
- Patricia Brechlin - EPA, Region 6
- Marshall Cedilote - Texas Water Commission, District 7
- Gregory Johnson - Texas Water Commission, District 7
- Sandra Fowler - ICF Inc.
- Kevin Greiner - ICF Inc.

To gain an understanding of Armco's waste management practices, the VSI personnel visited all the SWMU locations identified during the preliminary review and the morning meeting. The VSI and follow-up telephone calls provided the information needed to make the recommendations presented in this report.

Photographs taken during the VSI are included in Appendix A.

1.3 REPORT

This report summarizes the information obtained during the PR and VSI and evaluates the information in terms of the RFA objectives. The facility is described in Section 2.0; the environmental setting is discussed in Section 3.0; the SWMUs and AOCs are identified in Sections 4.0 and 5.0, respectively; potential human and environmental targets are described in Section 6.0; and conclusions and recommendations are presented in Section 7.0.

2.0 FACILITY DESCRIPTION

This section of the RFA report describes the location of the facility and its historical and current operations, provides a list of identified SWMUs and AOCs, and describes the sources and types of waste managed at the facility.

2.1 SITE LOCATION

The Armco site, in Harris County, Texas, currently encompasses 480 acres on Industrial Road, 12 miles due east of Houston (Fowler, 1993). Figure 2-1 displays the regional location of the facility and Figure 2-2 outlines the boundaries of the land owned by Armco. Appendix B contains a map of the facility that includes all SWMUs and AOCs. The site's geographic coordinates are 29 degrees 45 minutes 25 seconds north latitude and 95 degrees 12 minutes 00 seconds west longitude.

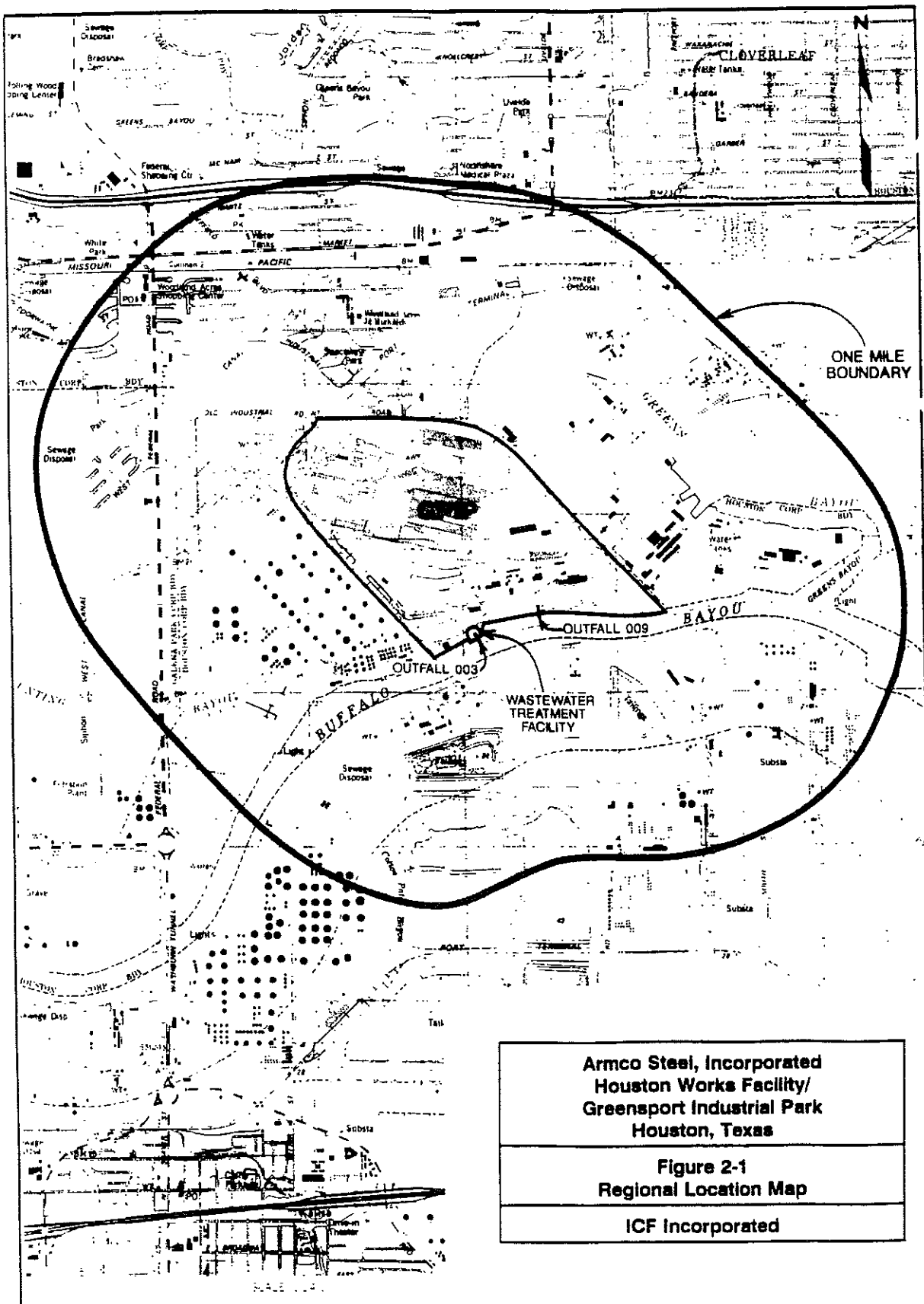
Standard facility data are provided below:

Facility Location:	13100 Industrial Road, Houston, Texas 77013
Facility Address:	13100 Industrial Road, Houston, Texas 77013
Facility Contact:	James Berryman
Telephone:	(713) 455-8457
EPA ID Number:	TXD000802942
TWC Reg. No.:	30124

2.2 FACILITY OPERATIONS AND HAZARDOUS WASTE MANAGEMENT

The Armco facility is the site of a former steel plant and is currently the Greensport Industrial Park. Steel operations began in 1942 and ceased in 1984. In 1984, the steel plant closed its 32 SWMUs (e.g., impoundments) and leased building space to tenants. Since 1984, tenants have occupied the site and have used 14 additional SWMUs for their own activities.

From 1942 to 1984, the facility was an integrated steel mill that used raw materials to produce iron ingots, which were processed on site into molten steel. The steel was processed into finished products, including blooms, billets, bars, and wire. Raw materials -- limestone, coal, and iron ore -- were brought in to begin the steel-making process. The facility operated a lime plant, coke plant, and a sinter plant, which prepared these materials for the blast furnace. Unlike the other two plants, the sinter plant managed waste material consisting of blast furnace sludge and metal fines from throughout the plant, in addition to iron ore, coke, and lime raw materials. This material was mixed and fired in the sinter plant to produce sinter, a material used in iron making. The blast furnace, fueled by natural gas, produced iron ingots from iron ore, lime, coke, and sinter. For a few years in the early 1970s, Armco experimented with a direct

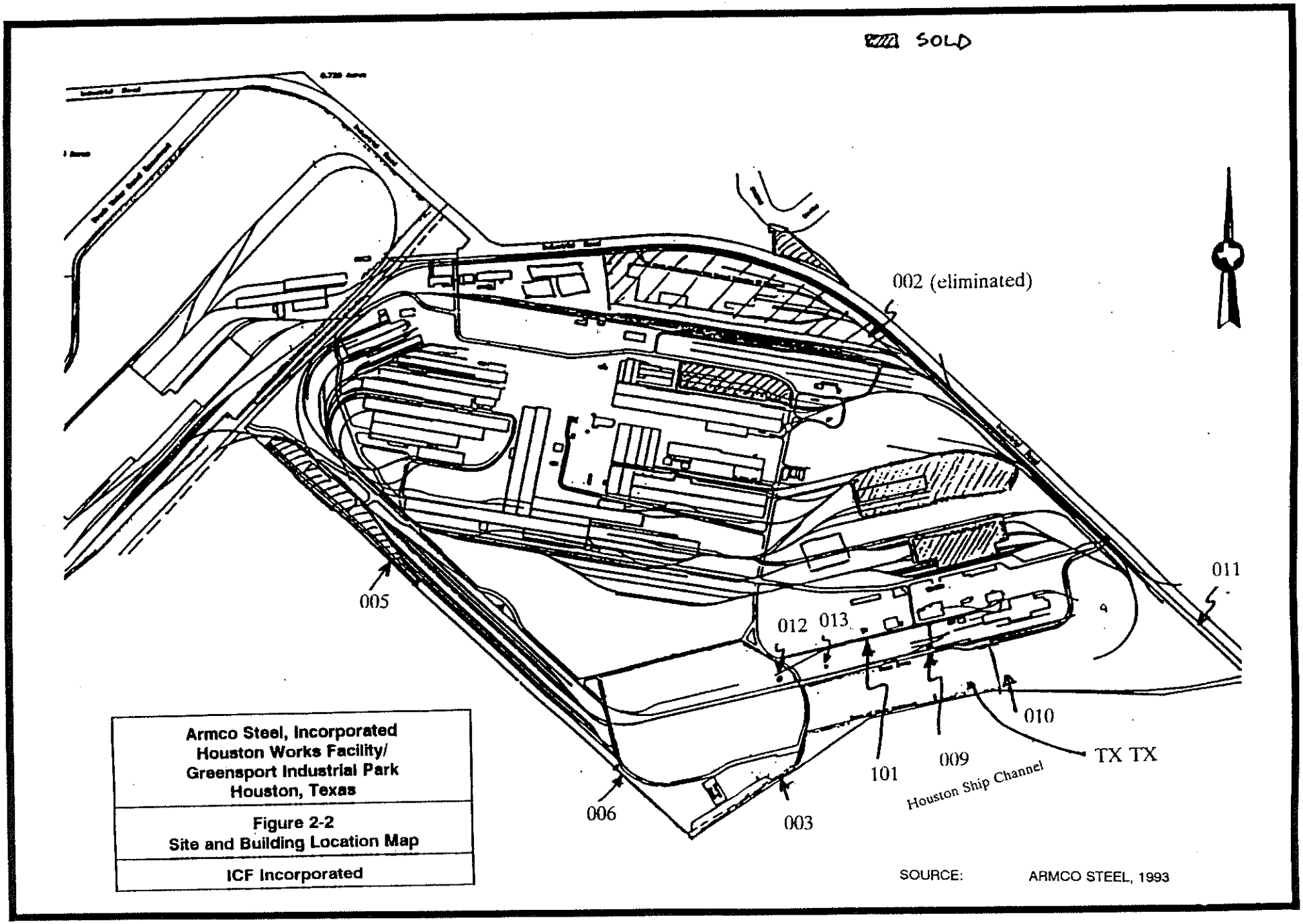


Armco Steel, Incorporated
Houston Works Facility/
Greensport Industrial Park
Houston, Texas

Figure 2-1
Regional Location Map

ICF Incorporated

SOURCE: UNITED STATES DEPARTMENT OF INTERIOR GEOLOGICAL SURVEY USGS;
USGS 7.5 MINUTE SERIES - JACINTO CITY & PASADENA QUADRANGLES



Armco Steel, Incorporated Houston Works Facility/ Greensport Industrial Park Houston, Texas
Figure 2-2 Site and Building Location Map
ICF Incorporated

reduction plant, which by-passed the blast furnace and reduced iron ore into iron-rich pellets.

The iron ingots and pellets were processed into molten steel in the facility's open hearth and electric furnaces. The open hearth furnaces operated from 1942 until the early 1970s. Starting in the mid-60s, Armco began using electric furnaces. By 1975, six electric furnaces were operating, housed in Electric Furnace Shop No. 1 and No. 2. These operated until the plant began decreasing production in the early 1980s.

The molten steel from the electric or open hearth furnaces was poured into molds to form ingots. When the ingots cooled and solidified, they were taken to other furnaces called soaking pits. The ingots were soaked in heat until they reached uniform temperature throughout. The reheated ingots were taken to finishing mills, where they were "hot formed" or rolled into slabs, blooms, or billets in various mills on site. Some steel was further processed into wire, which involved shaping and coating.

Currently, the industrial park has 29 tenants. Each tenant is responsible for the storage and disposal of all its wastes. A list of current tenants, lease start dates, and each tenant's type of business is provided in Table 2-1.

Table 2-1

Current Greensport Industrial Park (GPIP) Tenants

Tenant	Contact	Lease Start Date	Type of Business
Bayshore Industries	Eddie Johnson	July 1993	Equipment storage
Coastal Cargo Texas	Brett Holliday	October 1991	Stevedoring
Columbia Power Partners	Steve Strasser	November 1991	Equipment storage
Compressor Engineering Corp.	Bill Gantz	September 1991	Equipment storage
Crown Central Petroleum	Jim Davis	February 1991	Equipment storage
D&L Quality Painting, Inc.	Dave Berryhill	October 1991	Painting and blasting
Econo-Rail Corp.	Jack Porterfield	September 1990	Railcar storage and refurbishing
Gavlick Machinery	Mark Haba	May 1991	Equipment storage
General Welding Works, Inc.	A.L. Minton	September 1991	Steel fabrication and welding

Table 2-1 (Continued)

Current Greensport Industrial Park (GPIP) Tenants

Tenant	Contact	Lease Start Date	Type of Business
GLB Woodworks	Gary Berryman	October 1989	Woodworking
Global Drilling Fluids, Inc.	Eddie Woods	November 1990	Product storage
Gulf Stream Marine, Inc.	Dave Wharton	April 1992	Stevedoring
Helmerich & Payne Int. Drilling Equipment storage		Joe Hood	October 1991
IBC Industries	Harry Leather	October 1992	Equipment storage
Koppers Industries, Inc.	Phil Heal	April 1987	Roadway easement
Louisiana Chemical Equipment	Andy Caul	September 1991	Equipment storage
Marias Industries TX, Inc	Tom Cuti	June 1993	Steel beam storage
National Export Crating Co.	Sam Marraquin	July 1993	Packing and crating
Petroleum Equipment	Bill West	1993	Equipment storage
Power System Engineering	Dwayne Lantrip	August 1987	Equipment assembly and storage
Richardson Steel Yard	Nolan Richardson	February 1990	Stevedoring and equipment storage
Stolt-Nielsen, Inc	Kevin Chimento	February 1989	Railcar storage and cleaning
Techna Systems, Inc	Craig Hereford	May 1993	Office space
Texas Distribution Services	Dale Thompson	September 1990	Product storage
Venture Transport, Inc	David Spencer	June 1992	Equipment storage
Vessel Fabricators	Doug Cox	August 1991	Steel fabrication and welding

Table 2-1 (Continued)

Current Greensport Industrial Park (GPIP) Tenants

Tenant	Contact	Lease Start Date	Type of Business
Westinghouse	Dave Burke	December 1988	Turbine refinishing
Wyatt Field Service Co.	Royce Havard	September 1989	Steel fabrication and welding
Yellow Rose Steel Plate Co.	James McClendon	May 1990	Equipment storage

2.2.1 Summary Of Wastes Handled

Between 1942 and 1984, the Armco plant generated RCRA wastes (e.g., toxic sludge), mostly as a result of routine operation and maintenance of its heating and cooling processes. The Armco plant generated the following hazardous waste streams: (1) tar decanter sludge (K087) from the Coke Plant; (2) dust and sludge from the Blast Furnace; (3) filter cake and baghouse dust from its six electric furnaces; (4) spent pickle liquor, copper coating solution, and permanganate solution from wire-finishing operations; (5) Mold Foundry sand; (6) process wastewaters containing mill scale, oil, and grease; (7) PCB transformer oil; and (8) used oils and spent solvents used in steel-manufacturing units and for maintenance work.

Until the early 1970s, the coke plant tar decanter sludge was disposed of in the East Acid Surface Impoundment. This included tar and spent pickle liquor. In 1973, the surface impoundment was closed and the coke plant waste was proposed to be disposed of in an underground injection well. Armco applied for a permit, which was denied and, therefore, the coke plant incinerator was constructed. The incinerator structure included a sump, tank, and pumps to store and deliver ammonia liquor to the incinerator. A tar decanter tank stored sludge, which was disposed of off site.

The Sinter Plant, Blast Furnace, and Direct Reduction Plant generated emissions during operations. Wet scrubbing of these emissions generated wastewater, which was transferred to a clarifier for sludge removal and returned to the scrubbers for reuse. Recovered sludge was dewatered and transferred to the Ore Bedding Area for use as a feedstock for the Sinter Plant. Blowdown from the Blast Furnace and Sinter Plant was discharged to the Coke Plant Quenching Basin and Tower to be used to cool coke. There was no blowdown from the Direct Reduction Plant. Treated emissions from these units' air pollution control equipment were recycled to the furnaces to recover their heat value.

Six electric furnaces, located in Electric Furnace Shop Nos. 1 and 2, also generated emissions during operations. Wet scrubbing generated wastewater containing hexavalent chromium, lead, and cadmium, which was transferred to a clarifier for sludge removal. Recovered sludge was dewatered, and the resulting filter cake (K061) was shipped off site for disposal at the Greens Bayou Landfill. Prior to 1975, wastewater was continually discharged through NPDES-permitted outfall 011. After 1975, wastewater from Shop No. 1 was routed to the West Surface Impoundment. Also in 1975, a baghouse was installed at Shop No. 2, which removed dust from the electric furnace emissions and made the clarifier at this shop unnecessary. Baghouse dust was disposed off site at the Greens Bayou Landfill.

The wire-finishing processes generated spent acid pickle liquor, copper coating solution, and permanganate solution. These wastes were stored in tanks and disposed of off site. The rinse waters were transferred to the West Surface Impoundment.

Wastewater from the Mold Foundry was allowed to settle and cool in settling chambers. This wastewater was recycled to the Mold Foundry scrubbers. Blowdown was discharged to the Houston Ship Channel and the sludge separated in the settling chambers was transferred to the East End Surface Impoundment or immediately shipped off site for disposal.

In addition to the electric furnace scrubber water, other process wastewaters were transferred to the West Surface Impoundment for cooling and settling. The sources of wastewater in the West Surface Impoundment included the following units:

- The Central Mill System Scale Pit, which was a settling pit for the Plate Mill, Rolling Mill, Combination Mill, Blooming Mill, Structure Mill, and Merchant Mill;
- The Central Furnace System Basin and Cooling Tower, which contained non-contact wastewater and blowdown from the furnace system; and
- Ditches and a Settling Basin, which managed the wastewater from the Central Mill System and Central Furnace prior to transfer to the West Surface Impoundment.

Used oil was collected from wastewater in the Settling Basin prior to transfer of the wastewater to the West Surface Impoundment. After cooling and settling, water in the West Surface Impoundment was pumped back to the scrubbers in Electric Furnace Shop No. 1 for reuse; excess wastewater was discharged to the Houston Ship Channel through a NPDES-permitted outfall.

Wastewater from the Rod Mill went to the North and South Rod Mill Surface Impoundments for settling and cooling until 1970, when the Rod Mill was shut down. After cooling and settling, water was recycled to the Rod Mill and excess wastewater was transferred to the West Surface Impoundment.

Two container storage areas were managed by Armco. One area stored drums of PCB-contaminated transformer oil waste, and the other stored used oil and spent solvents for less than 90 days. All stored waste was disposed of off site.

Off-site locations used for the disposal of hazardous and non-hazardous wastes generated during Armco's operations have included the following:

- Aptus (EPA ID No. KSD0981506025), Coffeyville, KS (disposal of PCB waste);
- Chemical Waste Management (EPA ID No. LAD000777201), Carlyss, Louisiana (disposal of PCB waste, asbestos, paint sludge, tar, and asphalt);
- Disposal Systems, Inc. (EPA ID No. TXD000719518), Deer Park, Texas (disposal of hazardous wire cleaning waste);
- Empak (EPA ID No. TXD097673149), Deer Park, Texas (disposal of hazardous waste from wire cleaning);
- Greens Bayou Landfill (EPA ID No. TXD000802959, owned and operated by Armco, Inc.) Houston, Texas (disposal of electric furnace dust and filter cake media);
- Malone Services (EPA ID No. TXD027147115), Deer Park, Texas (disposal of hazardous waste from wire cleaning);
- Meklo Processing, Houston, Texas (disposal of spent solvents);
- Rollins Environmental Services (EPA ID No. TXD055141378), Deer Park, Texas (disposal of PCB waste, asbestos, spent solvents, tar, and asphalt); and
- Statewide Industrial Services, Houston, Texas (transportation of electric furnace waste). (Engineering-Science, Inc., 1984)

When the steel plant ceased operation in 1984, Armco began to lease and sell areas of the site for a variety of industrial activities. Parcels of land that have been sold include the following:

- Northwest Steel owns the wide flange area in the western part of the site;
- Howard Industries owns the former Pipe Mill area in the northern portion of the site;
- Foroni Metals of Texas owns rail areas in the southwestern part of the site; and

- Amerival Corporation owns several non-contiguous pieces of land in the central area of the site.

Since 1984, when the plant ceased operation, current and former tenants of Greensport Industrial Park have managed 14 SWMUs that were also examined during the VSI. Of these, 13 are still being used. Most current tenants are stevedores or landlords who lease space for equipment storage and do not generate any waste. Several other tenants conduct welding and/or cleaning operations and routinely generate only non-hazardous waste (scrap metal and other non-hazardous solid waste). However, some tenants have managed hazardous or unknown wastes generated during cleaning, maintenance, and other operations. These tenants include:

- D&L Quality Painting, a routine generator of spent blast and paint waste;
- Westinghouse, a generator of unknown waste chemicals, oils, and paints;
- Texas Distribution Services, a storer of containers filled with expired or off-specification products;
- Coastal Cargo, a stevedoring company that maintains a vehicle repair area that generates waste oil; and
- A former tenant, TexTrac, that abandoned piles of sulfur and coke in an open area by the former ore bedding area.

Off-site disposal of hazardous waste and waste oil by current tenants is handled by the following contractors:

- Browning Ferris Industries (EPA ID No. TXD000618538), McCarty Landfill, Houston, Texas (disposal of spent blast media, paint cans, and solid waste);
- Laughlin Environmental, Houston, Texas (disposal of spent solvents); and
- O'Rourke, Houston, Texas (recycler of used oil filters and oily rags at the Liondell Petrochemical company's refinery).

Off-site disposal of non-hazardous solid waste is handled by several contractors, including the following:

- Acco Waste Disposal, Inc.;
- Houston Compressed Steel;
- J.E.C. Waste;
- Proler Metal Processing;
- Robinson Scrap and Tank;

- Star Disposal, Inc.;
- Waste Management, Inc.; and
- Western Waste Control.

2.2.2 Identification of Solid Waste Management Units

As a result of this RFA, a total of 46 SWMUs have been identified at the Armco facility. The definition of a SWMU adopted in this RFA reflects current EPA policy as stated in the July 15, 1985 Codification Rule (50 FR 28701), the RCRA Facility Assessment Guidance Document (October 1986), and other recent policy directives from the Office of Solid Waste and Emergency Response (OSWER). A SWMU is defined as any discernable waste management unit at a RCRA facility from which hazardous constituents might migrate. This definition does not include accidental spills from production areas and units in which wastes have not been managed (e.g., product storage areas). Table 2-2 presents a summary of the regulatory and operating status for all SWMUs identified at the facility. No AOCs were identified during the VSI conducted August 30 - September 1, 1993.

Table 2-2

Armco - Houston Works Facility/Greensport Industrial Park
Solid Waste Management Units

SWMU No.	Name of Solid Waste Management Unit	RCRA Regulated[1]	Operating Status[2]
1	Coke Plant Tar Decanter System	No	Removed
2	Coke Plant Ammonia Liquor Sump	No	Closed
3	Coke Plant Ammonia Liquor Transfer Pump	No	Closed
4	Coke Plant Ammonia Liquor Storage Tank	No	Closed
5	Coke Plant Ammonia Liquor Feed Pump	No	Closed
6	Coke Plant Incinerator	No	Closed

[1] RCRA regulated under interim status.

[2] SWMUs that have been certified closed because of hazardous waste activity for TWC are listed at "closed" in this table. SWMUs that were removed from the site but not certified closed are listed as "removed". SWMUs that have not been certified closed or removed are listed as "active" or "inactive".

Table 2-2 (Continued)

Armco Solid Waste Management Units

SWMU No.	Name of Solid Waste Management Unit	RCRA Permitted	Operating Status
7	Ore Bedding Area	No	Inactive
8	Blast Furnace Sludge Waste Pile	No	Closed
9	Sinter Plant	No	Removed
10	Blast Furnace	No	Removed
11	Coke Plant Quenching Basin and Tower	No	Removed
12	Direct Reduction Plant	No	Removed
13	Electric Furnace Shop Nos. 1 and 2 Clarifiers and Storage Area	No	Removed
14	Electric Furnace Shop No. 2 Baghouse	No	Inactive
15	Electric Furnace Shop No. 2 Baghouse Dust Storage Area	No	Removed
16	Spent Pickle Liquor Tanks	No	Removed
17	Copper Coating Solution Tank	No	Removed
18	Permanganate Tank	No	Removed
19	Rinse Tank for Wire Mill Cleaning	No	Removed
20	Mold Foundry Settling Chamber	No	Removed
21	East End Surface Impoundment	No	Inactive
22	East Acid Surface Impoundment	No	Inactive
23	Central Mill System Scale Basin	No	Removed
24	Central Furnace System Cooling Tower and Basin	No	Removed
25	Ditches and Pumping Basin for the West Surface		

Table 2-2 (Continued)

Armco Solid Waste Management Units

SWMU No.	Name of Solid Waste Management Unit	RCRA Permitted	Operating Status
	Impoundment	No	Removed/ Inactive
26	Used Oil Storage Tank	No	Removed
27	West Surface Impoundment	No	Closed
28	North Rod Mill Surface Impoundment	No	Closed
29	South Rod Mill Surface Impoundment	No	Closed
30	Construction Rubble Waste Pile	No	Closed
31	Wire Mill Container Storage Area	No	Removed
32	Open Hearth Container Storage Area	No	Inactive
33	Waste Pile of Discarded Railroad Ties	No	Active
34	Coke and Sulfur Waste Piles	No	Removed
35	D&L Blast Area	No	Active
36	D&L Spent Blast Dumpsters	No	Active
37	D&L Used Paint Can Dumpster	No	Active
38	D&L Container Storage Area	No	Active
39	Econo-Rail Container Storage Area	No	Active
40	Westinghouse Container Storage Area	No	Active
41	Texas Distribution Services Container Storage Area No. 1		NoActive
42	Texas Distribution Services Container Storage Area No. 2		NoActive
43	Stolt-Nielsen Wastewater Tanks	No	Active

Table 2-2 (Continued)

Armco Solid Waste Management Units

SWMU No.	Name of Solid Waste Management Unit	RCRA Permitted	Operating Status
44	Coastal Cargo Vehicle Repair Area	No	Active
45	Non-hazardous Waste Pile	No	Active
46	Various Solid Waste and Scrap Metal Dumpsters	No	Active

2.3 REGULATORY STATUS

This section summarizes the regulatory status of the Armco facility. Information is presented on permits and other environmental compliance issues under both state and federal regulations.

2.3.1 Permits

The Armco facility submitted a Notification of Hazardous Waste Activity on August 15, 1980 and a Part A Permit Application on November 18, 1980, to EPA Region 6 for handling of ignitable and corrosive wastes (Armco, Inc., 1980). Armco was granted interim status on July 17, 1981 (U.S. EPA, 1981). On July 11, 1983, Armco submitted a revised application to reflect the current operations and to conform to the most recent regulations (Armco, 1983). When the plant ceased operations in 1984, Armco submitted documentation to withdraw from the hazardous waste management facility permitting process. On August 15, 1985, the Texas Department of Water Resources (TDWR) issued a letter stating that the Armco site qualilified for the claimed exclusion from the permitting process; however, the facility had not operated so as to qualify for exemption from permitting requirements at all times since November 19, 1980. Because of the hazardous waste management operations at the open hearth drum storage area, TDWR stated that Armco was required to comply with closure procedures for that unit (TDWR, 1985).

The Armco facility is permitted by EPA and the state for its surface water discharges. Armco operates under NPDES Permits Nos. TX0008524 and TX0088404, and TWC Permit Nos. 00509 and 02579 for controlled discharges to the Houston Ship Channel Segment No. 1007 via approved outfalls. Armco operated under these permits when in full steel-making operation, and the permits have been amended over the years to reflect the changes in operations from steelmaking to an industrial park.

In the early 1970s, Armco applied for and received Underground Injection Control Permit No. WDW90. The underground injection well was never used and has been sealed. (U.S. EPA, 1972)

When steel-making operations were underway, the Armco facility operated under Texas Air Control Board Permit Nos. R-15, R-1373, R-3742, R-5042, R-5072, C-6145, C-6570, C-9056 and under the PSD program Permit No. CAA TX-27. Various units at the facility were covered under these permits including stacks and other stationary sources at the coke plant, rolling mills, and reheat furnaces. The coke plant units were permitted for carbon dioxide, phenol, cyanide, ammonia, VOC, nitrogen oxide, Part-Chem-U, and/or sulfur oxide emissions. The furnace stacks were permitted for VOC, nitrogen oxide, Part-Chem-U and/or sulfur oxide emissions. Several units in the coke plant had no allowable emission rates for ammonia, yet were permitted. (TACB, 1982)

Facility representatives indicated the Coke Plant Incinerator was permitted by TACB; however, Armco was unable to furnish a copy of this permit and this permit was not located in the facility's files at TWC in Austin, Texas.

2.3.2 Other Environmental Compliance Issues

Armco was found in violation of a TSCA regulation during an EPA inspection on April 29, 1982, for failing to inspect the transformers at the proper frequency, failing to repair
moderately leaking transformers, and failing to weigh each capacitor. On August 2, 1982, TWC personnel inspected 13 PCB transformers that had leaked. All transformers had steel pans to catch drips and were inside buildings on concrete floors. The inspection revealed one transformer had a minor leak (about half of the pan surface was coated with PCB oil); all other leaks found were one-drop leaks. All PCB leaks were required to be corrected by the end of August 1982. (TWC, 1982)

During closure activities for the East Acid Surface Impoundment (SWMU No. 22) in 1984, localized ground-water contamination was documented. In March 1985, the TWC Disposal Facility Unit referred this problem to TWC's enforcement branch for action. No follow-up documentation was found. (TWC, 1985b)

In January 1991, the Texas Bureau of Air Quality Control (TBAQC) received an anonymous complaint about asbestos removal activities at the Armco site. TBAQC personnel inspected the site and found no evidence of asbestos removal activity. The facility representative stated that abatement activities were completed in October 1984 by a licensed contractor (Engineering-Science, Inc., 1984).

Numerous NPDES and TWC surface water discharge violations were documented from 1985 - 1993. Many violations were cited for Outfall 003, Armco's sewage treatment discharge. The following violations were documented[3]:

---

[3] This information is taken from EPA and TWC inspection reports and correspondence sent to Armco on these dates.

Date	Outfall	Parameter
10/21/85	003	Biochemical Oxygen Demand (BOD)
10/30/85	003; 101	Total Suspended Solids (TSS), BOD; pH
1/9/87	-	Reporting requirements
1/21/87	003; 001	Total Organic Compounds (TOC); Oil and Grease (O&G), TOC
2/11/87	-	Reporting requirements
3/31/87	003	pH, Total Residue Chlorine (TRC)
4/4/87	-	Reporting requirements
3/31/88	003	TSS, TRC, pH
5/15/88	002	TRC
8/31/88	002	TSS
12/28/88	003	TRC
11/30/89	003; 006, 010	TSS; O&G
12/14/89	003; 006	TSS, BOD, TRC; O&G, TSS
2/22/90	003	BOD
9/5/90	003; 006, 012	BOD, TSS; O&G
6/92	003	TSS
9/29/92	003	TSS
2/25/93	003; 009	TSS; pH
4/21/93	003	TSS

Armco is a potentially responsible party at the French Ltd. Superfund site.

3.0 ENVIRONMENTAL SETTING

This section describes the environmental setting of the Armco site and provides a basis for evaluating potential impacts on human health and the environment from existing or potential releases of hazardous materials to the environment from the SWMUs identified at the site. The following subsections describe the land use, climate, topography and surface water, soils, geology, and ground water of the site.

3.1 LAND USE

The Armco site, in Harris County, Texas, encompasses 480 acres on Industrial Road, 12 miles due east of Houston. This is a residential and industrial area along the Houston Ship Channel.

The residential population within one mile of the site is approximately 1500 and the population of public use areas (e.g., parks and schools) within 0.5 miles is 425 (Engineering- Science, 1984). Population centers within three miles include Deer Park and Galena Park. Currently, approximately 300 workers are employed at the Armco site.

The San Jacinto Battleground State Historic Park and Monument is located 5 miles to the east (Rand McNally, 1991). The site is situated on a segment of the ship channel that is used for navigation purposes only (Engineering-Science, Inc., 1984).

3.2 CLIMATE

The climate of Harris County is predominantly marine. Because of the proximity to Galveston Bay (about 5 miles) and the occurrence of numerous small streams and bayous, fogs are commonplace. Prevailing winds are from the southeast and south (USDA, 1976).

The mean annual temperature is 69 degrees Fahrenheit; temperatures are moderate due to the influence of winds from the Gulf of Mexico, which result in mild winters and relatively cool summer nights. On the average, there are 7 - 15 days each year with minimum temperatures of 32 degrees Fahrenheit. The growing season is 271 days. (Soil Conservation Service, 1976)

Another effect of the Gulf is abundant rainfall: the average annual precipitation is 48 inches (Texas Monthly Press, 1987).

3.3 TOPOGRAPHY AND SURFACE WATER

The topography of the area is slightly sloped south and southeast, toward the Houston Ship Channel. The northern corner of the site slopes east, toward Greens Bayou. The Armco site is within a 100-year flood plain. (Engineering-Science, Inc., 1984)

During operation of the steel plant, water was obtained from several sources. The ship channel provided water for cooling and other industrial purposes, 13 on-site wells provided industrial and potable water, and a community well 4.5 miles north of the site provided potable water. Currently, only the on-site wells are used for industrial and potable water. The community water supply is located on property that has been sold off.

Land subsidence at the site is significant due to extensive ground-water withdrawal from the aquifers underlying the Houston area. Facility representatives indicated that from the early 1960s, when data collection began, until 1977, the land at the site subsided 9.5 feet.

3.4 SOILS

The soils at the site are predominately the Beaumont association of clays. Permeability is estimated at 10^{-5} centimeters per second (Engineering-Science, Inc., 1984).

The Beaumont association of clays are characterized as nearly level soil on the coastal prairie of Harris County, averaging 0.3 percent slope. This soil is poorly drained. Surface runoff and internal drainage are very slow and the available water capacity is high. In some areas surface cracking occurs when the soil is dry. Rainwater enters rapidly through the cracks but then moves very slowly into the soils. Excess surface water is a management concern. (USDA, 1976)

3.5 GEOLOGY

The sedimentary deposits in Harris County slope gently toward the Gulf of Mexico, south of the site. The deposition of the sedimentary materials was caused by several cyclical changes in sea level, and through time, each formation was progressively tilted toward the Gulf from an original gradient of one foot per mile to more than ten feet per mile. The dip of the formations toward the axis of the Mississippi Embayment results in a series of roughly parallel bands that form the outcrop areas of the formations. These deposits have since been broken by normal growth faults, which extend many thousands of feet in depth. Streams increased the dissection of the land surface, and very little of the original flat topography remains between the stream channels. (Baker & Wall, 1976)

The Beaumont Clay Formation is an outcropping stratigraphic unit at the site (Engineering-Science, Inc., 1984). It is the youngest Pleistocene age deposit that outcrops in Harris County. It underlies nearly all of the Lake Charles-Bernard soil association, the Midland-Beaumont soils, and the Aldine-Ozan soils. The Beaumont Formation consists of fluvial and deltaic deposits with some small areas that may have originated as coastal marsh and lagoonal deposits. This formation has a relict depositional pattern with slightly elevated distributaries or meander ridges commonly associated with deltaic depositional environments. The low areas that separate the ridges are the old surfaces of backswamps or flood basins. A pattern of meandering streams is faintly discernable on the surface of ridges in Harris County. (Soil Conservation Service, 1976)

The sediments of the Beaumont Formation were derived from several different fluvial sources. In the Houston, Crosby, and Baytown areas, the source of sediment was the Pleistocene ancestor of the Brazos River. Underlying this formation are the Pleistocene deposits of the Montgomery and Bentley Formations and the Willis Sand, which are also deposits of fluvial deltaic origin. (Baker & Wall, 1976)

The underlying Tertiary sediments of the Gulf Coastal Plain are tens of thousands of feet thick at the coastline and represent primarily marine and shallow marine environments of deposition. (Baker & Wall, 1976)

Soil boring sampling taken during Armco's closure activities confirmed that Beaumont Clay is the underlying geologic deposit of the site. The clay encountered was

very stiff and hard, with a low moisture content and blocky texture. Approximately 30 feet below the surface, the texture varied from silt-sized particles to well-sorted, clean, fine-to-medium- grained quartzose sand. (ERM-Southwest, Inc., 1984)

3.6 GROUND WATER

The aquifer system underlying Harris County in general and the Armco site in particular is the Gulf Coast Aquifer, which includes sediments in the Catahoula, Jasper, Burkeville, Evangeline, and Chicot units. The Gulf Coast Aquifer underlies about 35,000 square miles of the Coastal Plain and extends 90 to 120 miles inland from the coastline. The Jasper, Evangeline, and Chicot Aquifers all occur above the Catahoula confining system. This basal confining unit occurs at depths greater than 7,600 feet in Harris County. The Evangeline and Chicot Aquifers are hydraulically connected and form the water table aquifer in Harris County. The fresh water lens within these aquifers extends to depths of 3,000 feet (Kreitler, et al., 1977). Huge quantities of water are pumped from these aquifers, primarily from depths between 500 to 1,000 feet, for municipal supply, industrial use, and irrigation. (Baker & Wall, 1976)

Aquifer production is related to the distribution and thickness of high-percent sand units within the aquifers. Fault movement has been associated with extensive ground-water production from fault-offset sands in Harris County. This movement is believed to be caused by increased compaction of sediments on the producing side of the fault. In areas where there are stratigraphic units containing a relatively low percentage of sand and a high percentage of mud, ground-water withdrawals sometimes cause the decline of the potentiometric surface and local land subsidence. As the percentage of mud increases in the stratigraphic units, the potential for subsidence and reactivation of growth faults increases. Pumping from thick units with a high percentage of sand has a minimal impact on the subsidence rates (Baker & Wall, 1976).

The Chicot Aquifer, in southeast Texas, is distinguished from the Evangeline Aquifer on the basis of a higher sand-clay ratio in the sediments. Differences in hydraulic conductivity or water levels in some areas are also used to differentiate these aquifers. The Chicot Aquifer thickens from 400 to 800 feet from west to east across Harris County. Recharge to this aquifer is from the updip section, which crops out at the surface in parts of northern Harris County. Ground-water movement within the aquifer is southeasterly, toward the coast. (Baker, 1979)

The combined structural framework of the Chicot and Evangeline Aquifers control the regional hydrology between Harris and Galveston Counties. A major fault zone between these counties acts as a partial hydrologic barrier that separates two partly independent flow systems. An abrupt change in elevation of the base of the fresh water lens is coincident with the fault. Below 1,000 feet, meteoric ground water is not flowing across the fault boundary into Galveston County, but is discharging into shallower aquifers in southern Harris County. (Kreitler, et al., 1977)

Individual sand beds of the Evangeline Aquifer are characteristically tens of feet thick. In Harris County, this aquifer ranges in thickness from 600 to 1,400 feet. Recharge to this aquifer is from the overlying Chicot Aquifer and from infiltration of precipitation in the outcrop areas. (Baker, 1979)

The Evangeline Aquifer is separated from the underlying Jasper Aquifer by the Burkeville confining system, which retards the interchange of ground water between the

two aquifers. The Burkeville system consists of stratigraphic units of silt and clay interbedded with individual sand layers. The configuration of this system is highly irregular and transgresses formational boundaries. The Burkeville confining system is approximately 300 feet thick in Harris County. (Baker, 1979)

The Jasper Aquifer is approximately 1,100 feet thick in Harris County and its configuration is also highly irregular because its boundaries also transgress formational boundaries. The Jasper Aquifer is underlain by the Catahoula confining system. This unit approaches thicknesses of up to 800 feet in the central region of the county. The Catahoula sediments consist of clay or tuff with some interbedded sand. In most areas this confining system is generally deficient in sand, which precludes its classification as an aquifer. Hydrologically, the Catahoula serves to retard the interchange of water between the overlying Jasper Aquifer and underlying aquifers. (Baker, 1979)

At the Armco site, the water table is reached at 5 - 30 feet; 13 on-site wells that are used for industrial and potable water tap the Chicot and Evangeline Aquifers at depths of 600 - 2,500 feet. Beaumont Clay Formation makes up most of the upper Chicot Aquifer with about 200 feet of sands and clays. The lower unit of the Chicot is composed of about 425 feet of sand, silt and clay from the Pleistocene age. The Evangeline consists of nearly 2,000 feet of sediments and rock of alluvial origin (sand, silt, and clay) (Engineering-Science, Inc., 1984).

4.0 SOLID WASTE MANAGEMENT UNITS

This section discusses the solid waste management units (SWMUs) at the Armco facility and evaluates actual or potential releases from those units. ICF identified 26 SWMUs during the PR and 46 during the VSI. The first 32 SWMUs discussed in this section were used exclusively by Armco for steel making. The remaining 14 SWMUs discussed in this section have been used by tenants leasing space from the Greensport Industrial Park after steel-making operations ceased in 1984. Of these, 13 SWMUs are currently used for the tenants' individual purposes. Appendix A provides photographs of the SWMUs and Appendix B shows the location of the units. Unless otherwise referenced, data presented in this chapter were obtained during the VSI.

4.1 SWMU NO. 1 - COKE PLANT TAR DECANTER SYSTEM (Photograph 1)

Description

This unit consisted of a decanter system designed to collect, store, and separate tar decanter sludge from the flushing liquor and primary coolers generated in the by-product Coke Plant during production of coke. The system included two carbon steel, aboveground, closed-top tar decanter receiving tanks measuring 53 feet by 16 feet by 12 feet (Armco, Inc., 1993d); a carbon steel, aboveground, closed-top tar storage tank with a capacity of approximately 75,000 gallons; 30-gallon, plastic-lined fiber containers; and associated piping and equipment.

This unit was located on a concrete pad in the southeastern portion of the Armco facility, south of the Mold Foundry Building, west of the East End Surface Impoundment (SWMU No. 21), and north of the Houston Ship Channel. The units were surrounded by a metal fence, but had no secondary containment. The tanks were located east of the Coke Plant Ammonia Liquor Sump (SWMU No. 2).

This unit was dismantled and removed from the site in the mid-1980s. At the time of the VSI conducted on August 30 - September 1, 1993, the site of the former system consisted of gravel and dirt. Sparse vegetation was observed in the area around the tank site.

Status

This unit operated from 1972 until 1984, when the Armco facility shut down. It was not RCRA-regulated under interim status.

Waste Type

This unit received tar decanter sludge from the flushing liquor and primary coolers used in the Coke Plant. This waste was RCRA characteristic for toxicity and contained phenol and naphthalene.

Waste Management

Tar sludge was pumped from the Coke Plant to the tar decanter receiving tanks through dedicated underground and aboveground piping. Tar rose to the surface of the tank, while the sludge sank to the bottom. The tar was raked to the tar storage tank,

collected by Allied Chemicals, Inc., and transported off site for use in the production of creosote.

Before 1973, sludge that settled in the tank was raked into portable bins and transported by truck to the East Acid Surface Impoundment (SWMU No. 22) for disposal. After the surface impoundment closed in 1973, the sludge was raked into fiber containers and taken off site for disposal or incineration (Armco, Inc., 1993d).

Environmental Releases

There have been no documented or reported releases from this unit, and there were no signs of releases observed during the VSI on August 30 - September 1, 1993. However, since the system has been decommissioned and dismantled, it was not possible to assess its integrity during the VSI.

Remedial Action Taken

Upon closure of the Armco facility in 1984, the tank system was dismantled and removed from the Armco site.

Suggested Action

ICF recommends that an RFI be conducted at this unit.

Reasons

This unit managed waste that was RCRA-characteristic for toxicity and contained phenol and naphthalene. Armco removed the tank system without going through the proper closure procedure for a hazardous waste management unit. The integrity of the system could not be assessed because it has been removed from the site. No secondary containment was provided for the area.

4.2 SWMU NO. 2 - COKE PLANT AMMONIA LIQUOR SUMP (Photographs 2 and 3)

Description

This unit was an in-ground, open-top, concrete tank of unknown dimensions that was covered with a steel grating. It was used to collect ammonia liquor waste produced during cooling of the coke oven gas. Hard piping was used to continuously transfer the excess ammonia liquors to this unit from the Coke Plant's flushing liquor system. Hard piping also connected this unit to the Coke Plant Incinerator (SWMU No. 6), to which the ammonia liquor was pumped for incineration.

This unit was located on a concrete pad in the southeastern portion of the Armco facility, south of the Mold Foundry Building, west of the East End Surface Impoundment (SWMU No. 21), and north of the Houston Ship Channel. The unit was located between the Coke Plant Incinerator and the Coke Plant Ammonia Liquor Storage Tank (SWMU No. 4), and just north of the Coke Plant Ammonia Liquor Feed Pump (SWMU No. 5). The unit was surrounded by a metal fence. It had no secondary containment for liquid releases.

This unit was removed and the area was filled with aggregate in the mid-1980s. At the time of the VSI conducted on August 30 - September 1, 1993, the site of the former

sump consisted of a dark dirt and clay depression measuring approximately 12 feet by eight feet. Sparse vegetation was observed in this area.

Status

This unit operated from 1972 until 1984, and was not RCRA-regulated under interim status. It was certified closed for TWC in 1986 by ERM-Southwest, Inc.

Waste Type

This unit received excess ammonia liquor from the Coke Plant after it was used to cool coke oven gas for reuse. The major constituents found in this waste stream are directly related to the destructive distillation of coal. This waste likely contained significant quantities of suspended solids, oils, greases, ammonia, sulfide, thiocyanate, beryllium, cyanide, and phenolic compounds, and had a pH of more than 8.5. This waste may also have contained significant concentrations of acrylonitrile, benzene, chloroform, 2,4-dimethylphenol, ethylbenzene, fluoranthene, naphthalene, phenol, phthalates, benzopyrene, chrysene, acenaphthylene, anthracene, fluorene, phenanthrene, pyrene, toluene, antimony, arsenic, copper, selenium, and zinc. (U.S. EPA, 1982b)

Waste Management

Ammonia liquor waste was pumped through dedicated aboveground and underground piping to this unit after it was used to cool coke oven gas in the Coke Plant. The waste was normally fed continuously into the Coke Plant Incinerator (SWMU No. 6) from this unit; however, if the Coke Plant Incinerator was not in operation, the ammonia liquor waste was transferred to the Coke Plant Ammonia Liquor Transfer Pump (SWMU No. 3) and pumped to the Coke Plant Ammonia Liquor Storage Tank (SWMU No. 4) for temporary storage until the Coke Plant Incinerator was in operation.

Environmental Releases

There have been no documented or reported releases from this unit, and there were no signs of releases observed during the VSI on August 30 - September 1, 1993. However, the site of the former sump consisted of a depression in the earth that was significantly darker than the surrounding area. Since the unit was decommissioned and dismantled, it was not possible to assess its integrity during the VSI.

Remedial Action Taken

TWC approved the closure plan for this unit on November 26, 1984. Closure of this unit involved the following activities (ERM-Southwest, Inc., 1986):

- Removing the unit and all associated equipment;
- Rinsing the unit and all associated piping with clean water until the equipment and water were visually clean;
- Treating the rinsate in the wastewater treatment system and discharging rinsate through NPDES-permitted Outfall No. 003; and
- Filling the site with aggregate to eliminate the hole.

Sampling was not conducted as part of closure. This unit was certified closed for TWC on March 17, 1986.

Suggested Action

ICF recommends that an RFI be conducted at this unit.

Reasons

This unit managed waste that was RCRA-characteristic for toxicity, and the unit had no secondary containment. The integrity of this unit could not be assessed because it has been removed from the site. Since sampling was not conducted as part of closure, it is not possible to determine whether any releases to the environment occurred during operation of this unit.

4.3 SWMU NO. 3 - COKE PLANT AMMONIA LIQUOR TRANSFER PUMP (Photograph 3)

Description

This unit was an aboveground pump used to transfer ammonia liquor waste from the Coke Plant Ammonia Liquor Sump (SWMU No. 2) to the Coke Plant Ammonia Liquor Storage Tank (SWMU No. 4). The unit was located east of the Ammonia Liquor Feed Pump (SWMU No. 5), and north of the Coke Plant Ammonia Storage Tank. Dedicated aboveground and underground piping connected this unit to the Coke Plant Ammonia Liquor Storage Tank and the Coke Plant Ammonia Liquor Sump. This unit was surrounded by a metal fence. It had no secondary containment for liquid releases.

This unit was dismantled and removed from the site in the mid-1980s. At the time of the VSI conducted on August 30 - September 1, 1993, the site of the former pump consisted of broken concrete, dirt, and gravel. Sparse vegetation was observed in this area.

Status

This unit operated from 1972 until 1984 and was not RCRA-regulated under interim status. It was certified closed for TWC in 1986 by ERM-Southwest, Inc.

Waste Type

This unit received excess ammonia liquor originating from the Coke Plant after it was used to cool coke oven gas. The major constituents found in this waste stream are directly related to the destructive distillation of coal. This waste likely contained significant quantities of suspended solids, oils, greases, ammonia, sulfide, thiocyanate, beryllium, cyanide, and phenolic compounds, and had a pH of more than 8.5. This waste may also have contained significant concentrations of acrylonitrile, benzene, chloroform, 2,4-dimethylphenol, ethylbenzene, fluoranthene, naphthalene, phenol, phthalates, benzopyrene, chrysene, acenaphthylene, anthracene, fluorene, phenanthrene, pyrene, toluene, antimony, arsenic, copper, selenium, and zinc. (U.S. EPA, 1982b)

Waste Management

This unit was used to pump ammonia liquor waste from the Coke Plant Ammonia Liquor Sump (SWMU No. 2) through dedicated piping to the Coke Plant Ammonia Liquor Storage Tank (SWMU No. 4) when excess capacity was needed to store this waste (e.g., when the Coke Plant Incinerator (SWMU No. 6) was not operating).

Environmental Releases

There have been no documented or reported releases from this unit, and there were no signs of releases observed during the VSI on August 30 - September 1, 1993. Broken concrete, gravel, and sparse vegetation covered the area around the unit. However, since the unit has been decommissioned and dismantled, it was not possible to assess its integrity during the VSI.

Remedial Action Taken

TWC approved the closure plan for this unit on November 26, 1984. Closure of this unit involved the following activities (ERM-Southwest, Inc., 1986):

- Removing the unit and associated equipment;
- Rinsing the unit and all associated piping with clean water until the equipment and water were visually clean;
- Treating rinsate in the wastewater treatment system and discharging it through NPDES-permitted Outfall No. 003; and
- Dismantling and removing the unit from the site.

Sampling was not conducted as part of closure. This unit was certified closed for TWC on March 17, 1986.

Suggested Action

ICF recommends that an RFI be conducted at this unit.

Reasons

This unit managed waste that was RCRA-characteristic for toxicity, and the unit had no secondary containment. The integrity of this unit could not be assessed because it has been removed from the site. Since sampling was not conducted as part of closure, it is not possible to determine whether any releases of hazardous constituents occurred during operation of this unit.

4.4 SWMU NO. 4 - COKE PLANT AMMONIA LIQUOR STORAGE TANK (Photograph 3)

Description

This unit was a 70,000-gallon, carbon steel, aboveground, closed-top tank used to store ammonia liquor waste when additional storage capacity was needed to accumulate the waste before transfer to the Coke Plant Incinerator (SWMU No. 6). The Coke Plant

Ammonia Liquor Transfer Pump (SWMU No. 3) transferred excess ammonia liquor to this unit from the Coke Plant Ammonia Liquor Sump (SWMU No. 2) through underground and aboveground piping. Dedicated aboveground piping also connected this unit to the Coke Plant Ammonia Liquor Feed Pump (SWMU No. 5), which pumped ammonia liquor to the Coke Plant Incinerator.

The unit was located on a concrete pad of unknown dimensions just east of the Coke Plant Ammonia Liquor Feed Pump and the Coke Plant Ammonia Liquor Sump. This pump and all associated units were surrounded by a metal fence. According to facility representatives, secondary containment for this unit was provided by a concrete pad and berm.

The tank and its secondary containment structures were dismantled and removed in the mid-1980s. At the time of the VSI conducted on August 30 - September 1, 1993, the former site of the tank consisted of gravel and dirt. Sparse vegetation was also observed in the area.

Status

This unit operated from 1972 until 1984 and was not RCRA-regulated under interim status. It was certified closed for TWC in 1986 by ERM-Southwest, Inc.

Waste Type

This unit received excess ammonia liquor originating from the Coke Plant after it was used to cool coke oven gas. The major constituents found in this waste stream are directly related to the destructive distillation of coal. This waste likely contained significant quantities of suspended solids, oils, greases, ammonia, sulfide, thiocyanate, beryllium, cyanide, and phenolic compounds, and had a pH of more than 8.5. This waste may also have contained significant concentrations of acrylonitrile, benzene, chloroform, 2,4-dimethylphenol, ethylbenzene, fluoranthene, naphthalene, phenol, phthalates, benzopyrene, chrysene, acenaphthylene, anthracene, fluorene, phenanthrene, pyrene, toluene, antimony, arsenic, copper, selenium, and zinc. (U.S. EPA, 1982b)

Waste Management

This unit received ammonia liquor waste from the Coke Plant Ammonia Liquor Sump (SWMU No. 2) via the Coke Plant Ammonia Liquor Transfer Pump (SWMU No. 3) if excess capacity was needed to accumulate the waste before transfer to the Coke Plant Incinerator (SWMU No. 6). Waste was pumped from this unit to the incinerator by the Ammonia Liquor Feed Pump (SWMU No. 5).

Environmental Releases

There have been no documented or reported releases from this unit, and there were no signs of releases observed during the VSI on August 30 - September 1, 1993. Broken concrete, gravel, and sparse vegetation covered the area around the unit. However, since the unit has been decommissioned and dismantled, it was not possible to assess its integrity during the VSI.

Remedial Action Taken

TWC approved the closure plan for this unit on November 26, 1984. Closure of this unit involved the following activities (ERM-Southwest, Inc., 1986):

- Removing 14,000 gallons of ammonia liquor and sludge contained in the tank at closure and disposing the waste at an off-site permitted commercial class I (non-hazardous) disposal facility;
- Hydroblasting the tank interior and discharging rinsate through NPDES-permitted Outfall 003; and
- Dismantling and removing the tank from the site.

Sampling was not conducted as part of closure. This unit was certified closed for TWC on March 17, 1986.

Suggested Action

ICF recommends that an RFI be conducted at this unit.

Reasons

This unit managed waste that was RCRA-characteristic for toxicity. The integrity of this unit could not be assessed because it has been removed from the site. Since sampling was not conducted as part of closure, it is not possible to determine whether any releases of hazardous constituents occurred during operation of this unit.

4.5 SWMU NO. 5 - COKE PLANT AMMONIA LIQUOR FEED PUMP (Photographs 2 and 3)

Description

This unit was a pump used to transfer ammonia liquor waste from the Coke Plant Ammonia Liquor Storage Tank (SWMU No. 4) to the Coke Plant Incinerator (SWMU No. 6). The unit was located between the incinerator and the storage tank, and just south of the Coke Plant Ammonia Liquor Sump (SWMU No. 2). Aboveground dedicated piping connected this unit to the Coke Plant Ammonia Liquor Storage Tank and the Coke Plant Incinerator.

This unit was located on a concrete pad within the concrete secondary containment berm that surrounded the Coke Plant Ammonia Liquor Storage Tank. The unit and associated piping were surrounded by a metal fence.

At the time of the VSI conducted on August 30 - September 1, 1993, the site consisted of gravel and dirt. Sparse vegetation was observed in the area around the site of the unit.

Status

This unit operated from 1972 until 1984 and was not RCRA-regulated under interim status. It was certified closed for TWC in 1986 by ERM-Southwest, Inc.

Waste Type

This unit received excess ammonia liquor from the Coke Plant after it was used to cool coke oven gas. The major constituents found in this waste stream are directly related to the destructive distillation of coal. This waste likely contained significant quantities of suspended solids, oils, greases, ammonia, sulfide, thiocyanate, beryllium, cyanide, and phenolic compounds, and had a pH of more than 8.5. This waste may also have contained significant concentrations of acrylonitrile, benzene, chloroform, 2,4-dimethylphenol, ethylbenzene, fluoranthene, naphthalene, phenol, phthalates, benzopyrene, chrysene, acenaphthylene, anthracene, fluorene, phenanthrene, pyrene, toluene, antimony, arsenic, copper, selenium, and zinc. (U.S. EPA, 1982b)

Waste Management

This unit was used to pump ammonia liquor waste from the Coke Plant Ammonia Liquor Storage Tank (SWMU No. 4) to the Coke Plant Incinerator (SWMU No. 6) through dedicated piping.

Environmental Releases

There have been no documented or reported releases from this unit, and there were no signs of releases observed during the VSI on August 30 - September 1, 1993. Broken cement, gravel, and sparse vegetation covered the area around the unit. Since the unit has been decommissioned and dismantled, it was not possible to assess its integrity during the VSI.

Remedial Action Taken

TWC approved the closure plan for this unit on November 26, 1984. Closure of this unit involved the following activities (ERM-Southwest, Inc., 1986):

- Removing the unit and associated equipment;
- Rinsing the unit and all associated piping with clean water until the equipment and water were visually clean;
- Treating the rinsate in the wastewater treatment system and discharging it through NPDES-permitted Outfall No. 003; and
- Dismantling and removing the unit and associated piping from the site.

Sampling was not conducted as part of closure. This unit was certified closed for TWC on March 17, 1986.

Suggested Action

ICF recommends that an RFI be conducted at this unit.

Reasons

This unit managed waste that was RCRA-characteristic for toxicity. The integrity of this unit could not be assessed because it has been removed from the site. Since

sampling was not conducted as part of closure, it is not possible to determine whether any releases of hazardous constituents occurred during operation of this unit.

4.6 SWMU NO. 6 - COKE PLANT INCINERATOR (Photographs 2 and 3)

Description

This unit was designed to incinerate ammonia liquor waste from the Coke Plant. The unit was powered by coke gas that was transferred to the unit through dedicated piping. Hard piping also connected this unit to the Coke Plant Ammonia Liquor Sump (SWMU No. 2) and the Coke Plant Ammonia Liquor Feed Pump (SWMU No. 5). This unit had no emission control system, and, according to facility representatives, completely destroyed all contaminants in its liquid waste stream with no visible emissions.

This unit was situated on a concrete pad of unknown dimensions located west of the Coke Plant Ammonia Liquor Sump and the Coke Plant Ammonia Liquor Feed Pump. This unit was surrounded by a metal fence. It had no secondary containment for liquid releases.

Approximately eight square feet of this concrete pad was still in place during the VSI conducted on August 30 - September 1, 1993; the area surrounding the pad consisted of gravel and sparse vegetation. Some vegetation was growing through cracks in the concrete pad.

Status

This unit operated from 1972 until 1984, when the facility closed. According to facility representatives, this unit's air emissions were permitted by TACB; however, Armco was unable to furnish a copy of this permit, and the RFA team did not find a copy of this permit in the facility's files at TWC in Austin, Texas. The unit was certified closed for TWC in 1986 by ERM-Southwest, Inc.

Waste Type

This unit received excess ammonia liquor from the Coke Plant after it was used to cool coke oven gas. The major constituents found in this waste stream are directly related to the destructive distillation of coal. This waste likely contained significant quantities of suspended solids, oils, greases, ammonia, sulfide, thiocyanate, beryllium, cyanide, and phenolic compounds, and had a pH of more than 8.5. This waste may also have contained significant concentrations of acrylonitrile, benzene, chloroform, 2,4-dimethylphenol, ethylbenzene, fluoranthene, naphthalene, phenol, phthalates, benzopyrene, chrysene, acenaphthylene, anthracene, fluorene, phenanthrene, pyrene, toluene, antimony, arsenic, copper, selenium, and zinc. (U.S. EPA, 1982b)

Waste Management

This unit received ammonia liquor waste that was generated during Coke Plant operations. Ammonia liquor waste was normally fed continuously to this unit from the Coke Plant Ammonia Liquor Sump (SWMU No. 2). When the incinerator was not operating, the ammonia liquor waste was routed to the Coke Plant Ammonia Liquor Storage Tank (SWMU No. 4). The waste was then pumped to the incinerator by the Ammonia Liquor Feed Pump (SWMU No. 5) after the incinerator was reactivated. Emissions were released to the atmosphere.

Environmental Releases

This unit released emissions generated during burning of ammonia liquor waste. There were no signs of releases observed during the VSI on August 30 - September 1, 1993. Broken concrete, gravel, and sparse vegetation covered the area around the unit. However, since the unit has been decommissioned and dismantled, it was not possible to assess its integrity during the VSI.

Remedial Action Taken

TWC approved the closure plan for this unit on November 26, 1984, which called for dismantling of the unit and removal from the Armco site. Since ammonia liquor was reportedly destroyed nearly instantly after injection into the incinerator, the closure plan did not call for decontamination of the incinerator at closure (ERM-Southwest, Inc., 1986). This unit was certified closed for TWC on March 17, 1986. Sampling was not performed as part of closure.

Suggested Action

ICF recommends that an RFI be conducted at this unit.

Reasons

This unit managed waste that had hazardous constituents. The integrity of this unit could not be assessed because it was dismantled and removed from the site. Since sampling was not conducted as part of closure, it is not possible to determine whether any releases of hazardous constituents occurred during operation of this unit.

4.7 SWMU NO. 7 - ORE BEDDING AREA (Photograph 4)

Description

This area consisted of an open, unlined, earthen area and an elevated conveyor used to accumulate iron ore fines, blast furnace sludge, and limestone in a layered pile and transfer these materials to the Sinter Plant (SWMU No. 9). The area was situated south of the West Surface Impoundment (SWMU No. 27) and west of the Blast Furnace Sludge Waste Pile (SWMU No. 8), in the southwest corner of the facility.

At the time of the VSI conducted on August 30 - September 1, 1993, the area consisted of a hard-packed sand and gravel road. The northern half of this road consisted of substantially darker soil; the cause of this difference is unknown. No material from the

ore bedding pile was observed. A rain puddle containing clear stormwater runoff was observed to the south of the area.

Status

This area was used as an ore bedding area from 1956 until the early 1980s. It was not RCRA-regulated under interim status.

Waste Type

This unit received dust and sludge produced during scrubbing of Blast Furnace (SWMU No. 10) emissions after this material had dried in the Blast Furnace Sludge Waste Pile (SWMU No. 8). This sludge contained fine particles of iron ore, coke, and limestone. Blast furnace sludge EP toxicity data indicate that this sludge contained detectable concentrations of arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, fluoride, and nitrate. Of these, lead levels (measured at levels ranging from 0.28 to 0.4 mg/l) and cadmium levels (ranging from 0.023 to 0.116 mg/l) have been regularly found in concentrations above the National Interim Primary Drinking Water Standards (NIPDWS) limits. This sludge also was found to leach (in distilled water) concentrations of lead, mercury, and fluoride that exceeded NIPDWS levels. (ERM-Southwest, Inc., 1985)

This area also accumulated mill scale, oil, and grease from the East End Surface Impoundment (SWMU No. 21) and the Central Mill System Scale Basin (SWMU No. 23). Based on available data, mill scale is made up of 70 - 75 percent iron and consists of ferrous oxide (FeO) and ferric oxide (Fe_2O_3) and is typically contaminated with oil and grease as a result of oil conditioning, oil spills, line ruptures, and excessive dripping of lubricants (U.S. EPA, 1982d). In addition, coke and limestone were collected in this area.

Waste Management

Sludge from the Blast Furnace Sludge Waste Pile (SWMU No. 8) and ore fines from the East End Surface Impoundment (SWMU No. 21), the Central Mill System Scale Basin (SWMU No. 23), and the Central Furnace System Cooling Tower and Basin (SWMU No. 24) were excavated to this area by truck and layered with limestone and coke. The material was placed on the conveyor of the Sinter Plant (SWMU No. 9) by using a backhoe. The conveyor fed this material into the furnace of the Sinter Plant.

Environmental Releases

No liner existed in this area, which still consists of hard-packed gravel and dirt. Therefore, waste and materials accumulated in this pile came into direct contact with the soil and ground water. There were no signs of contamination observed during the VSI on August 30 - September 1, 1993.

Remedial Action Taken

All materials accumulated in this area were placed on the conveyor of the Sinter Plant (SWMU No. 9) and fed into the furnace.

Suggested Action

ICF recommends that an RFI be conducted at this unit.

Reasons

Since this unit consisted of an open waste pile situated on an unlined, earthen surface, wastes and materials accumulated in this area are likely to have come into direct contact with the soil. Lead and cadmium concentrations in blast furnace sludge samples have been found in concentrations above the NIPDWS limits. Proximity to ground water may have led to ground-water contamination.

4.8 SWMU NO. 8 - BLAST FURNACE SLUDGE WASTE PILE (Photograph 4)

Description

This unit consisted of an above-grade waste pile of blast furnace sludge that was generated during wet scrubbing of flue gas emitted from the Blast Furnace (SWMU No. 10). The sludge pile was stored in an open, unlined, hard-packed gravel and dirt area located south of the West Surface Impoundment (SWMU No. 27) and east of the Ore Bedding Area (SWMU No. 7). It contained approximately 11,100 cubic yards of waste at the time the facility closed (ERM-Southwest, Inc., 1984).

At the time of the VSI conducted on August 30 - September 1, 1993, the area consisted of a hard-packed gravel and dirt road. The northern half of this road consisted of substantially darker soil; the cause of this difference is unknown. No material from the sludge waste pile was observed. A rain puddle containing clear stormwater runoff was observed to the south of the former pile.

Status

This unit operated from 1945 until the Blast Furnace ceased operating in the early 1980s. It was not RCRA-regulated under interim status.

Waste Type

This area was used to collect sludge waste generated from the wet scrubbing of blast furnace flue gas. This sludge contained fine particles of iron ore, coke, and limestone. Blast furnace sludge EP toxicity data indicate that this sludge contained detectable concentrations of arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, fluoride, and nitrate. Of these, lead levels (measured at levels ranging from 0.28 to 0.4 mg/l) and cadmium levels (ranging from 0.023 to 0.116 mg/l) have been regularly found in concentrations above the National Interim Primary Drinking Water Standards (NIPDWS) limits. This sludge also was found to leach (in distilled water) concentrations of lead, mercury, and fluoride that exceeded NIPDWS levels (ERM-Southwest, Inc., 1985).

Waste Management

During operations, roll-off containers containing sludge waste from the Blast Furnace (SWMU No. 10) and Direct Reduction Plant (SWMU No. 12) were transferred by truck to this area. The sludge was allowed to dry and was then transferred with a front-end loader to the Ore Bedding Area (SWMU No. 7).

Environmental Releases

Since this unit was an open waste pile, waste is likely to have come into direct contact with the soil and ground water. Lead and cadmium concentrations in sludge samples have been found in concentrations above the NIPDWS limits. There were no signs of contamination observed during the VSI on August 30 - September 1, 1993.

Remedial Action Taken

TWC approved the closure plan for this unit on December 12, 1985. At closure, this waste pile was excavated and transferred by truck to the West Surface Impoundment (SWMU No. 27). This unit was certified closed for TWC in 1986. Closure sampling indicated that the waste failed the EP toxicity test and the TDWR leachate test under NIPDWS for fluoride, lead, and mercury.

Suggested Action

ICF recommends that an RFI be conducted at this unit.

Reasons

Since this unit consisted of an open waste pile situated on an unlined, earthen surface, waste is likely to have come into direct contact with the soil. Lead and cadmium concentrations in sludge samples were found in concentrations above the NIPDWS limits. Proximity to ground water may also have led to ground-water contamination.

4.9 SWMU NO. 9 - SINTER PLANT (Photographs 5 and 6)

Description

The Sinter Plant consisted of a furnace, elevated conveyor belts, emission control equipment, clarifying basin, an emission control sludge storage area, and associated equipment used to fuse iron-rich fines into a raw material suitable for iron production and to manage wastes generated during this process. Sintering is an agglomeration process in which iron-bearing fines, flue dust, and sludge generated in steel-production units are mixed with iron ore, limestone, and finely divided fuel such as coke breeze (U.S. EPA, 1982b). These materials are fused together through combustion and the controlled use of oxygen. This agglomerate, in turn, is used as a raw material in the iron-making process.

A conveyor belt was used to transfer layered materials from the Ore Bedding Area (SWMU No. 7) to the top of the Sinter Plant, which was situated on a concrete base of unknown dimensions. Emissions from this unit were controlled through the use of wet scrubbers. Dedicated aboveground and underground piping was used to transfer scrubber wastewater to the aboveground, steel clarifier for this unit, which was located on a concrete base in an open area adjacent to the south side of the Sinter Plant. Vacuum filters were used to dewater sludge that settled to the bottom of the clarifier. Roll-off containers were used to collect dewatered sludge, while residual wastewater was recycled to the Sinter Plant scrubbers. When the wastewater could no longer be reused, dedicated piping was used to transfer blowdown from the clarifiers for the Sinter Plant to the clarifiers for the Blast Furnace (SWMU No. 10). According to facility representatives, no secondary containment for liquid releases was provided for the waste management areas at the Sinter Plant.

At the time of the VSI conducted on August 30 - September 1, 1993, the Sinter Plant had been removed and a new storage building had been erected at the site of this unit. Only a portion of the concrete foundation of the Sinter Plant remained, as shown in photograph 6. A patch of dark, clay-like soil with a sparse grass covering was observed to the south of the storage building. Broken concrete, dirt, gravel, and sparse vegetation were observed around the site.

Status

This unit was in use from 1956 until the early 1980s. It was not RCRA-regulated under interim status.

Waste Type

This unit received sludge from the Blast Furnace (SWMU No. 10) and mill scale from process areas after this material had been collected at the Blast Furnace Sludge Waste Pile (SWMU No. 8) and the Ore Bedding Area (SWMU No. 7). Blast furnace sludge contained fine particles of iron ore, coke, and limestone. Blast furnace sludge EP toxicity data indicate that this sludge contained detectable concentrations of arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, fluoride, and nitrate. Of these, lead levels (measured at levels ranging from 0.28 to 0.4 mg/l) and cadmium levels (ranging from 0.023 to 0.116 mg/l) have been regularly found in concentrations above the National Interim Primary Drinking Water Standards (NIPDWS) limits. This sludge also was found to leach (in distilled water) concentrations of lead, mercury, and fluoride that exceeded NIPDWS levels (ERM-Southwest, Inc., 1985).

This unit received mill scale containing iron oxide fines, oil, and grease from the East End Surface Impoundment (SWMU No. 21) and the Central Mill System Scale Basin (SWMU No. 23). Based on available data, mill scale is made up of 70 - 75 percent iron and consists of ferrous oxide (FeO) and ferric oxide (Fe_2O_3) and is typically contaminated with oil and grease as a result of oil conditioning, oil spills, line ruptures, and excessive dripping of lubricants (U.S. EPA, 1982d). In addition, coke and limestone were collected in this area.

This by-product material was mixed with limestone and coke breeze and fused in the Sinter Plant to produce sinter. Combustion in the Sinter Plant generated sinter dust and gaseous emissions. Based on available data, scrubbing of Sinter Plant emissions and cooling of a furnace generates wastewater that commonly contains oil, grease, suspended solids, ammonia, cyanide, fluoride, sulfide, phenols, and various toxic metals, such as cadmium, chromium, copper, lead, and zinc (U.S. EPA, 1982b). Fines generated during combustion also contain concentrations of these constituents.

Waste Management

A conveyor belt that extended from the Ore Bedding Area (SWMU No. 7) to the top of the Sinter Plant furnace was used to transfer iron-bearing materials, coke breeze, and limestone to the Sinter Plant furnace. This furnace heated these materials to produce sinter, an agglomeration of iron ore products used during iron production. The sinter was transferred to the Blast Furnace (SWMU No. 10) by truck for use in iron-making processes. Sinter fines were returned to the Ore Bedding Area for reuse in the Sinter Plant.

Wastewater generated during scrubbing of Sinter Plant emissions was transferred through underground and aboveground pipes to the clarifier for this plant. Sludge that settled to the bottom of the Sinter Plant clarifier was transferred through aboveground piping to vacuum filters used to dewater the sludge. Roll-off containers situated under the vacuum filters were used to collect dewatered sludge; these containers were regularly hauled by trucks and emptied at the Blast Furnace Sludge Waste Pile (SWMU No. 8).

Wastewater was recycled to the scrubbers until it had accumulated dissolved solids in concentrations that precluded reuse in the Sinter Plant. Once the wastewater could no longer be reused, the blowdown was transferred through underground and aboveground piping from the clarifiers for the Sinter Plant to the clarifiers for the Blast Furnace.

Environmental Releases

There were no reported or documented releases for this plant. During its active life, this unit released treated gaseous emissions into the atmosphere. During the VSI conducted on August 30 - September 1, 1993, dark, clay-like soil was observed just south of the building that is situated at the site of the former Sinter Plant. Since the plant has been decommissioned and dismantled, it was not possible to assess the integrity of each of its components during the VSI.

Remedial Action Taken

This unit was dismantled and demolished after the Armco facility was closed in the mid-1980s. A portion of the concrete foundation is all that remains. Sampling was not conducted as part of closure.

Suggested Action

ICF recommends that an RFI be conducted at this unit.

Reasons

This plant managed waste in open areas with no secondary containment. It was not possible to assess the integrity of the units in the plant and associated equipment because they have been removed from the site.

4.10 SWMU NO. 10 - BLAST FURNACE (Photograph 7)

Description

This unit consisted of a furnace, elevated conveyor belts, emission control equipment, clarifying basins, an emission control sludge storage area, and associated equipment used to make molten iron (pig iron) through the reduction of iron ore with limestone, coke, and sinter, and to manage wastes generated during this process. The blast furnace was a 225-foot tall cylindrical unit with 22-foot diameter stoves. The furnace rested on an eight-foot tall concrete base with dimensions of approximately 25 feet by 25 feet.

A conveyor belt was used to transfer feedstock to the top of the Blast Furnace. Emissions from this unit were controlled through a series of pollution control equipment, including a dry cyclone, primary and secondary wet scrubbers, and an electrostatic precipitator. Gas cleaning involved the removal of larger particulates by the cyclone. The wet scrubbers then removed fine particulates from the unit's emissions. The electrostatic precipitator was used to retain any remaining dry dust. Dedicated aboveground and underground piping was used to transfer scrubber wastewater to one of two 75-foot diameter, aboveground, concrete clarifiers, which were located approximately 150 feet to the north of the Blast Furnace unit in an open area on a concrete base. Vacuum filters were used to dewater sludge that settled to the bottom of the clarifier. Roll-off containers were used to collect dewatered sludge, while residual wastewater was returned through aboveground and underground piping to the Blast Furnace scrubbers. Dedicated piping was also used to transfer blowdown to the Coke Plant Quenching Basin and Tower (SWMU No. 11) when the wastewater could no longer be used. According to facility representatives, no secondary containment for liquid releases was provided for the waste management areas at the Blast Furnace.

At the time of the VSI on August 30 - September 1, 1993, only a portion of the concrete base remained at the site of the former plant. The area around the base consisted of concrete, dirt, and gravel. Mud and pools of clear stormwater were observed to the east of the concrete base.

Status

This unit operated from 1942 until approximately 1982. This unit was not RCRA-regulated under interim status.

Waste Type

This unit burned approximately 5,000 tons per day of coke, iron ingots, iron pellets, sinter, and lime, which generated blast furnace gas. Treatment of this gas in the pollution control equipment generated blast furnace dust, sludge, and wastewater. Water was also used to cool the furnace, stoves, and ancillary facilities, which also generated wastewater. Based on available data, blast furnace wastewater typically contains elevated concentrations of many conventional, nontoxic, and toxic pollutants, including suspended particulate matter, cyanide, fluoride, lead, zinc, phenols, and ammonia (U.S. EPA, 1982c).

Waste Management

An elevated conveyor belt that extended to the top of the Blast Furnace was used to transfer iron ore, sinter, limestone, and coke to this furnace. This furnace heated these materials to produce molten iron. Wastewater generated during scrubbing of Blast Furnace emissions was transferred through aboveground and underground piping to the clarifiers at the plant. Sludge that settled to the bottom of the clarifiers was transferred through aboveground piping to vacuum filters used to dewater the sludge. Roll-off containers situated under the clarifiers were used to collect dewatered sludge; these containers were regularly hauled by truck and emptied at the Blast Furnace Sludge Waste Pile (SWMU No. 8).

Wastewater from the clarifiers was continually recycled to the Blast Furnace scrubbers until it had accumulated dissolved solids in concentrations that precluded reuse in the Blast Furnace. Once the wastewater could no longer be reused, it was transferred through underground and aboveground piping to the Coke Plant Quenching Basin and Tower (SWMU No. 11). Blast furnace gas was recycled to the furnace to recover its heating value.

According to facility representatives, this unit was cleaned by removing and replacing the brick lining from the inside of the combustion chamber of the furnace every three to four years. This lining material was used as road aggregate.

Environmental Releases

During its active life, this unit released gaseous emissions into the air after treatment in a series of pollution control devices. There were no other documented or reported releases. During the VSI conducted on August 30 - September 1, 1993, there were no signs of spills or leakage that may have occurred from this unit. Since the unit has been decommissioned and dismantled, it was not possible to assess its integrity during the VSI.

Remedial Action Taken

This plant was dismantled and demolished in the mid-1980s. Only an eight-foot tall concrete base remains. Sampling has not been performed around the unit.

Suggested Action

ICF recommends that an RFI be conducted for this unit.

Reasons

This plant managed waste in open areas with no secondary containment. It was not possible to assess the integrity of the units in the plant and associated equipment because they have been removed from the site.

4.11 SWMU NO. 11 - COKE PLANT QUENCHING BASIN AND TOWER (No photograph)

Description

This unit consisted of a concrete basin and tower that collected wastewater used to cool coke as it came out of the Coke Plant. Blowdown from the Blast Furnace (SWMU No. 10), wastewater from the West Surface Impoundment (SWMU No. 27), and surface water from the Houston Ship Channel were transferred through underground and aboveground piping to the quenching basin, which measured approximately 50 feet by 20 feet by 20 feet deep (Armco, Inc., 1993c). Pipes transferred this water from the basin to the tower, from which the water was sprayed through flood nozzles over a car of hot coke. At TWC's request, Armco installed a mist eliminator (a hood that physically impeded steam) to trap steam and prevent it from migrating to the atmosphere through the top of the Quenching Tower (Armco, Inc., 1993d). There was no secondary containment provided for liquid releases. This unit was located near the southeast corner of the facility, south of the Coke Plant Incinerator and its associated units (SWMU Nos. 1 - 6).

This unit was dismantled and removed from the site in the mid 1980s. At the time of the VSI conducted on August 30 - September 1, 1993, the open area consisted of dirt and gravel.

Status

This unit was in operation from 1943 until the early 1980s. It was not RCRA-regulated under interim status.

Waste Type

This unit received blowdown from the Blast Furnace (SWMU No. 10), wastewater from the West Surface Impoundment (SWMU No. 27), and surface water from the Houston Ship Channel. Based on available data, blast furnace wastewater typically contains elevated concentrations of many conventional, nontoxic, and toxic pollutants, including suspended particulate matter, cyanide, fluoride, lead, zinc, phenols, and ammonia (U.S. EPA, 1982c). Facility representatives estimated that this unit received 20 - 25 gallons per minute of this wastewater (Armco, Inc., 1993d).

West Surface Impoundment wastewater contained primarily industrial process wastewaters containing mill scale, oils, grease, and rinsate containing concentrations of sulfuric acid solution used during acid pickling. Based on available data, mill scale is made up of 70 - 75 percent iron and consists of ferrous oxide (FeO) and ferric oxide (Fe_2O_3) and is typically contaminated with oil and grease as a result of oil conditioning, oil spills, line ruptures, and excessive dripping of lubricants (U.S. EPA, 1982d).

Spent pickle liquor solution contained sulfuric acid, chromium, lead, and solvents (F001 and F005) (Armco, Inc., 1983) and was RCRA characteristic for corrosivity and toxicity. Based on available data, spent pickle liquor typically has a pH of less than one,

and contains high concentrations of toxic metals, including dissolved iron, arsenic, cadmium, chromium, copper, lead, nickel, and zinc (The World Bank, 1983).

Facility representatives estimate that this unit received 100 gallons per minute of wastewater from the West Surface Impoundment.

Waste Management

Blowdown from the Blast Furnace (SWMU No. 10), wastewater from the West Surface Impoundment (SWMU No. 27), and surface water from the Houston Ship Channel were transferred to the Quenching Basin through underground and aboveground pipes. This wastewater was pumped to the Quenching Tower and sprayed through flood nozzles on hot coke to cool the coke and vaporize the wastewater. According to facility representatives, a mist eliminator contained the steam that resulted during this process (Armco, Inc., 1993d). According to facility representatives, the wastewater was completely vaporized during this process, and any pollutants in the wastewater fused to the coke product (Armco, Inc., 1993c). After quenching, the coke was dropped into open-top bins and transferred to the Blast Furnace for use in the production of molten iron.

Environmental Releases

Vaporization of the wastewater generated steam that likely contained air-borne contaminants. According to facility representatives a mist eliminator helped to trap most of contaminants in the steam that was formed during quenching operations.

Remedial Action Taken

This unit was dismantled with the Coke Plant in the early 1980s.

Suggested Action

ICF recommends that an RFI be conducted at this unit.

Reasons

Highly contaminated blowdown from the Blast Furnace was vaporized in this unit. There was no secondary containment for liquid releases. It was not possible to assess the integrity of the basin, tower, and associated equipment because they have been removed from the site.

4.12 SWMU NO. 12 - DIRECT REDUCTION PLANT (Photograph 8)

Description

The Direct Reduction Plant consisted of a furnace, elevated conveyor belts, emissions control equipment, two clarifying basins, an emissions control sludge storage area, and associated equipment. This plant was an experimental pilot plant that was designed to enrich iron ore without the use of the Blast Furnace (SWMU No. 10). The direct reduction process is designed to drive off enough oxygen gas so that iron pellets contain up to 97 percent natural iron, thereby allowing the steel producer to bypass the blast furnace (The World Bank, 1983). According to facility representatives, Armco

stopped using this plant because it did not operate effectively. The plant was located just west of the Sinter Plant (SWMU No. 9), near the southwest corner of the facility.

An elevated conveyor belt that extended to the top of the Direct Reduction Plant was used to transfer feedstock to the furnace. Emissions from this unit were controlled through the use of a wet scrubber. Dedicated aboveground and underground piping was used to transfer scrubber wastewater to one of two aboveground, concrete clarifiers of unknown dimensions, which were located approximately 200 feet to the northwest of the Direct Reduction Plant in an open area on a concrete base. Vacuum filters were used to dewater sludge that settled to the bottom of the clarifier. Roll-off containers were used to collect dewatered sludge, while residual wastewater was continually returned through aboveground and underground piping to the Direct Reduction Plant scrubbers. According to facility representatives, no secondary containment was provided for the waste management areas at the Direct Reduction Plant.

At the time of the VSI conducted on August 30 - September 1, 1993, the site of the former plant was covered with concrete, dirt, and gravel and was being used by stevedores for collection of miscellaneous solid waste in a roll-off container.

Status

This unit was an experimental pilot plant that operated in test mode from 1971 until 1973. It was not RCRA-regulated under interim status.

Waste Type

Treatment of gaseous emissions in the pollution control equipment generated dust, sludge, and wastewater. Water was also used to cool the furnace, stoves, and ancillary facilities, which also generated wastewater. Based on available data, Direct Reduction Plant wastewater typically contains elevated concentrations of many conventional, nontoxic, and toxic pollutants, including suspended particulate matter, cyanide, fluoride, lead, zinc, phenols, and ammonia (The World Bank, 1983).

Waste Management

An elevated conveyor belt that extended to the top of this furnace was used to transfer raw materials to this furnace. Wastewater generated during scrubbing of the Direct Reduction Plant furnace emissions was transferred through aboveground and underground piping to the clarifiers at the plant. Sludge that settled to the bottom of the clarifiers was transferred through aboveground piping to vacuum filters used to dewater the sludge. Roll-off containers situated under the filters were used to collect dewatered sludge; these containers were regularly hauled by truck and emptied at the Blast Furnace Sludge Waste Pile (SWMU No. 8).

Wastewater from the clarifiers was continually recycled to the Direct Reduction Plant scrubbers. Facility representatives believe that there was no wastewater blowdown from this unit.

Environmental Releases

During its active life, this unit released treated gaseous emissions into the air. During the VSI conducted on August 30 - September 1, 1993, there were no signs of spills or leakage on the concrete and gravel surrounding the site of this former unit. Since the unit has been decommissioned and dismantled, it was not possible to assess its integrity during the VSI.

Remedial Action Taken

This unit was dismantled and demolished in the mid-1980s.

Suggested Action

ICF recommends that an RFI be conducted for this unit.

Reasons

This plant managed waste in open areas with no secondary containment. It was not possible to assess the integrity of the units in the plant and associated equipment because they have been removed from the site.

4.13 SWMU NO. 13 - ELECTRIC FURNACE SHOP NOS. 1 AND 2 CLARIFIERS AND STORAGE AREA (Photograph 9)

Description

These units consisted of four concrete clarifiers, vacuum filters, a storage area and associated pipes used for primary settling and sludge collection of wastewater from electric furnaces in Shop Nos. 1 and 2. The clarifiers were situated on concrete bases and were partially below grade. The two clarifiers for Electric Furnace Shop No. 1 had a diameter of approximately 35 feet, while the two clarifiers for Electric Furnace Shop No. 2 had a diameter of about 70 feet. Aboveground piping connected the clarifiers to vacuum filters used to dewater sludge that collected in the clarifiers. Roll-off containers were situated below the filters to collect dewatered sludge. Aboveground and underground piping was used to continuously discharge wastewater from these units.

The units for Shop No. 1 were located 150 feet northwest of the shop, on a concrete pad in an open area. The units for Shop No. 2 were located 500 feet east of the shop, on a concrete pad in an open area. No secondary containment for liquid releases was provided for any of the units. These units were dismantled and removed from the site in the mid-1980s.

Status

The clarifiers at Electric Furnace Shop No. 1 were in operation from 1951 until 1984, when the facility was closed. The unit was not RCRA-regulated under interim status.

The clarifiers at Electric Furnace Shop No. 2 operated from 1965, when Electric Furnace Shop No. 2 began operations, until 1975, when the Electric Furnace Shop No. 2 Baghouse (SWMU No. 14) was installed.

Waste Type

These units received wastewater and sludge from Electric Furnace Shop Nos. 1 and 2. This waste contained electric furnace sludge (K061), which was RCRA characteristic for toxicity and contained concentrations of hexavalent chromium, lead, and cadmium. Armco estimated that approximately 11 million pounds of this sludge waste was generated annually during operations (Armco, Inc., 1983).

Waste Management

The clarifiers received wastewater from the electric furnace scrubbers through aboveground and underground piping. Sludge that settled to the bottom of the clarifiers was transferred through aboveground piping to vacuum filters used to dewater the sludge. Roll-off containers situated under the vacuum filters were used to collect dewatered sludge (i.e., filter cake). These containers were transported by Statewide Industrial Services of Houston, Texas, to the Greens Bayou landfill by truck. According to facility representatives, this waste was usually transported off site daily.

Prior to 1975, residual wastewater was continuously discharged from the clarifiers to the Houston Ship Channel through NPDES-permitted Outfall 015 (previously numbered Outfall 011). After 1975, residual water from the Electric Furnace Shop No. 1 Clarifier was continuously discharged via the Ditches and Pumping Basin for the West Surface Impoundment (SWMU No. 25) to the West Surface Impoundment (SWMU No. 27).

Environmental Releases

There were no documented or reported releases from this unit. However, since the units were dismantled and removed, it was not possible to assess the integrity of the units during the VSI.

Remedial Action Taken

The clarifiers were dismantled during closure of the Armco facility in 1984, with the concrete debris from the clarifiers being used as fill during closure of land disposal units.

Suggested Action

ICF recommends that an RFI be conducted at this unit.

Reasons

These units managed waste in open areas with no secondary containment. The integrity of the units and associated equipment could not be assessed because they have been removed from the site.

4.14 SWMU NO. 14 - ELECTRIC FURNACE SHOP NO. 2 BAGHOUSE (Photograph 10)

Description

This unit is a large baghouse located along the north side of Electric Furnace Shop No. 2. The unit consists of vacuum bags that trap particulate matter, a conveyor system, and a pelletizer used to solidify the dust into larger particles. The unit was situated on a concrete floor.

The baghouse is located on the north side of Electric Furnace Shop No. 2. The baghouse is still in place and intact, with some signs of rust. At the time of the VSI conducted on August 30 - September 1, 1993, the area around the unit consisted of broken concrete, gravel, dirt, and sparse vegetation.

Status

This unit was constructed in 1975 and operated until 1984, when the Armco facility ceased operations. It was not RCRA-regulated under interim status.

Waste Type

This unit was a pollution control device used to remove electric furnace dust (K061) from electric furnaces in Shop No. 2. This waste was RCRA characteristic for toxicity and contained hexavalent chromium, lead, and cadmium.

Waste Management

This unit continuously removed electric furnace dust particles from emissions of the Electric Furnace Shop No. 2. Emissions were transferred to the baghouse through a large duct approximately 80 feet in diameter. The dust was vacuumed into bags and periodically shaken out onto a conveyor system that led to a pelletizer. The pelletized dust was released to roll-off containers underneath the pelletizer at the Electric Furnace Shop No. 2 Baghouse Dust Storage Area (SWMU No. 15).

Environmental Releases

Treated air emissions were released from this unit. There have been no other documented or reported releases from this unit, and there were no signs of releases observed during the VSI on August 30 - September 1, 1993.

Remedial Action Taken

No remedial actions have been taken for this unit. The baghouse remains in place at the Electric Furnace Shop No. 2.

Suggested Action

ICF recommends no further investigation for this unit.

Reasons

All dust was removed, transferred, and pelletized in an enclosed area with a concrete floor. Any spilled dust pellets would have been contained on the concrete.

4.15 SWMU NO. 15 - ELECTRIC FURNACE SHOP NO. 2 BAGHOUSE DUST STORAGE AREA (No photograph)

Description

This unit consists of a concrete pad used to store open-top, roll-off containers that collected pelletized electric furnace dust collected and treated by the Electric Furnace Shop No. 2 Baghouse (SWMU No. 14). This storage area is located on the north side of Electric Furnace Shop No. 2, directly beneath the pelletizer units in the baghouse. No secondary containment was provided in this area.

Status

This unit was in use from 1975 until 1984. It was not RCRA-regulated under interim status.

Waste Type

This unit received pelletized electric furnace baghouse dust waste (K061). This waste was RCRA characteristic for toxicity and contained concentrations of hexavalent chromium, lead, and cadmium. Armco estimated that it generated approximately 33 million pounds of this waste each year of operations (Armco, Inc., 1983).

Waste Management

Pelletized dust was released to roll-off containers directly below the pelletizer unit of the baghouse. Once full, these roll-off containers were transported off site by Statewide Industrial Services of Houston, Texas, to Greens Bayou landfill, where the dust was disposed. According to facility representatives, these roll-off containers were usually transported off site daily.

Environmental Releases

There have been no documented or reported releases from this unit, and there were no signs of releases observed during the VSI on August 30 - September 1, 1993.

Remedial Action Taken

The roll-off containers used to store dust in this area were removed from the site. No other remedial actions have been taken at this area.

Suggested Action

ICF recommends no further investigation of this area.

Reasons

Pelletized dust was released to roll-off containers directly under the pelletizer. Any spilled pellets would have been contained on the concrete floor.

4.16 SWMU NO. 16 - SPENT PICKLE LIQUOR TANKS (2) (Photograph 11)

Description

These units consisted of two concrete, acid brick-lined, aboveground, open-top tanks. The units were used as part of a steel-finishing process in which steel wire was immersed in heated sulfuric acid solutions to remove surface scale (i.e., iron oxides) prior to coating (U.S. EPA, 1982e). One tank contained fresh sulfuric acid, which was used for particularly difficult descaling jobs. The other tank contained more dilute acid. The acid solution contained in these tanks was used until it became too weak to continue to treat steel products. According to facility representatives, the acid solution would be replaced every few days.

The tanks were located in the Wire Mill Building, which was located in the central part of the facility site, north of the Mill Spares Building. The tanks measured approximately 20 feet by 12 feet by eight feet deep and were situated on a concrete floor. No secondary containment for liquid releases was provided for these units.

At the time of the VSI conducted on August 30 - September 1, 1993, the tanks had been removed and the site consisted of an open area with a base of broken concrete and gravel. The area is currently leased by Texas Distribution Services for product storage.

Status

These units operated until closure of the Armco facility in 1984. The tanks were dismantled in 1986. They were not RCRA-regulated under interim status.

Waste Type

These units stored spent pickle liquor solution (K062), which contained sulfuric acid, chromium, lead, and solvents (F001 and F005) (Armco, Inc., 1983). This waste was RCRA characteristic for corrosivity and toxicity. Based on available data, spent pickle liquor typically has a pH of less than one and contains high concentrations of toxic metals, including dissolved iron, arsenic, cadmium, chromium, copper, lead, nickel, and zinc (The World Bank, 1983).

Waste Management

Steel wire was dipped into the acid to remove scale (i.e., iron oxide). When the strength of the pickle liquor had become too diminished, it became a waste and was transported off site. According to facility representatives, the acid solution was changed every few days.

Environmental Releases

There were no documented or reported releases from these units, and there were no signs of releases observed during the VSI on August 30 - September 1, 1993.

Remedial Action Taken

These tanks were dismantled and removed in 1986. The wire mill building was torn down in 1987.

Suggested Action

ICF recommends that an RFI be conducted at this unit.

Reasons

Treatment was performed in open-top tanks, and thus, spillage or overflow could have occurred. No secondary containment for liquid releases was provided for the unit. The integrity of these units could not be assessed because they were removed from the site. At the time of the VSI conducted on August 30 - September 1, 1993, the site consisted of gravel and broken concrete, which made it impossible to assess the original integrity of the floor.

4.17 SWMU NO. 17 - COPPER COATING SOLUTION TANK (Photograph 11)

Description

This tank was an open-top, aboveground steel tank containing copper solution that was used to produce coated wire. The tank was contained within an acid brick-lined, aboveground, open-top, concrete basin that also contained the Permanganate Tank (SWMU No. 18) and the Rinse Tank for Wire Mill Cleaning (SWMU No. 19).

This unit was located in the Wire Mill Building, which was located in the central part of the facility site, north of the Mill Spares Building. The unit was situated on a concrete floor with no secondary containment for liquid releases.

At the time of the VSI conducted on August 30 - September 1, 1993, the former site of the tank consisted of an open area with a base of broken concrete and gravel. The area is currently leased by Texas Distribution Services for product storage.

Status

This unit was in operation until the Armco facility closed in 1984. It was dismantled and removed in 1986. It was not RCRA-regulated under interim status.

Waste Type

This unit contained copper coating solution that had be to discarded when it became spent. Armco generated a maximum of 200,000 pounds of this waste annually (Armco, Inc., 1983). This waste was RCRA characteristic for corrosivity.

Waste Management

Waste copper coating solution was generated when the solution could no longer be used to produce copper-coated wire. This waste was transported off site by vacuum truck by Empak, Disposal Systems, Inc., and Malone Services, all of Houston, Texas.

Environmental Releases

There were no documented or reported releases from this unit, and there were no signs of releases observed during the VSI on August 30 - September 1, 1993.

Remedial Action Taken

This unit was dismantled and removed in 1986. The Wire Mill Building was torn down in 1987.

Suggested Action

ICF recommends that an RFI be conducted at this unit.

Reasons

Treatment was performed in open-top tanks, and thus, spillage or overflow could have occurred. No secondary containment for liquid releases was provided for the unit. The integrity of these units could not be assessed because they were removed from the site. At the time of the VSI conducted on August 30 - September 1, 1993, the site consisted of gravel and broken concrete, which made it impossible to assess the original integrity of the floor.

4.18 SWMU NO. 18 - PERMANGANATE TANK (Photograph 11)

Description

This tank was an open-top, aboveground steel tank containing permanganate solution that was used to produce coated wire. The tank was contained within an aboveground, open-top, acid-brick lined concrete basin that also contained the Copper Coating Solution Tank (SWMU No. 17) and the Rinse Tank for Wire Mill Cleaning (SWMU No. 19).

This unit was located in the Wire Mill Building, which was located in the central part of the facility site, north of the Mill Spares Building. The tank was situated on a concrete floor with no secondary containment for liquid releases.

At the time of the VSI conducted on August 30 - September 1, 1993, the site consisted of an open area with a base of broken concrete and gravel. The area is currently leased by Texas Distribution Services for product storage.

Status

This unit was in operation until the Armco facility closed in 1984. It was dismantled and removed in 1986. It was not RCRA-regulated under interim status.

Waste Type

This unit contained permanganate coating solution that had be to discarded when it became spent. This waste was RCRA characteristic for toxicity and contained chromium (Armco, Inc., 1983). Armco generated a maximum of 12,700 pounds of this waste annually (Armco, Inc., 1983).

Waste Management

Waste permanganate solution was generated when the solution could no longer be used to produce permanganate-coated wire. This waste was transported off site by vacuum truck by Empak, Disposal Systems, Inc., and Malone Services, all of Houston, Texas.

Environmental Releases

There have been no documented or reported releases from this unit, and there were no signs of releases observed during the VSI on August 30 - September 1, 1993.

Remedial Action Taken

This unit was dismantled and removed from the Armco site in 1986. The Wire Mill Building was torn down in 1987.

Suggested Action

ICF recommends that an RFI be conducted at this unit.

Reasons

Treatment was performed in open-top tanks, and thus, spillage or overflow could have occurred. No secondary containment for liquid releases was provided for the unit. The integrity of these units could not be assessed because they were removed from the site. At the time of the VSI conducted on August 30 - September 1, 1993, the site consisted of gravel and broken concrete, which made it impossible to assess the original integrity of the floor.

4.19 SWMU NO. 19 - RINSE TANK FOR WIRE MILL CLEANING (Photograph 11)

Description

This unit consisted of a steel, aboveground, open-top tank that was used to rinse acid solution from steel wire. The tank was contained within an aboveground, open-top, acid-brick lined concrete basin that also contained the Copper Coating Solution Tank (SWMU No. 17) and the Permanganate Tank (SWMU No. 18).

This unit was located in the Wire Mill Building, which was located in the central part of the facility site, north of the Mill Spares Building. The tank was situated on a concrete floor with no secondary containment for liquid releases.

At the time of the VSI conducted on August 30 - September 1, 1993, the site consisted of an open area with a base of broken concrete and gravel. The area is currently leased by Texas Distribution Services for product storage.

Status

This tank was in operation until 1984, when the facility closed. It was dismantled and removed in 1986. It was not RCRA-regulated under interim status.

Waste Type

This unit contained water that became contaminated with spent pickle liquor solution (K062). This waste contained sulfuric acid, chromium, lead, and solvents (F001 and F005) (Armco, Inc., 1983) and was RCRA characteristic for corrosivity and toxicity. Based on available data, spent pickle liquor typically has a pH of less than one and contains high concentrations of toxic metals, including dissolved iron, arsenic, cadmium, chromium, copper, lead, nickel, and zinc (The World Bank, 1983).

Waste Management

Steel wire was dipped into this tank to rinse off acid after the wire was dipped into the Spent Pickle Liquor Tanks (SWMU No. 16) to remove scale. Water contained in the Rinse Tank became increasingly contaminated; when it could no longer be used for rinsing purposes, it was discharged to the Ditches and Pumping Basin for the West Surface Impoundment (SWMU No. 25).

Environmental Releases

There were no documented or reported releases from this unit, and there were no signs of releases observed during the VSI on August 30 - September 1, 1993. Broken concrete and gravel covered the area around the unit.

Remedial Action Taken

This unit was dismantled and removed from the Armco site in 1986. The Wire Mill Building was torn down in 1987.

Suggested Action

ICF recommends that an RFI be conducted at this unit.

Reasons

Treatment was performed in an open-top tank, and thus, spillage or overflow could have occurred. The integrity of the unit could not be assessed because it was removed from the site. At the time of the VSI conducted on August 30 - September 1, 1993, the site consisted of gravel and broken concrete, which made it impossible to assess the original integrity of the floor. No secondary containment for liquid releases was provided for the unit.